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ABSTRACT

This activity notebook for grade 5 is one of a series developed in response to energy conservation. It contains activities that stress an energy conservation ethic and includes many values clarification activities for grade five. The packet is divided into two parts and provides the teacher with background information, concepts and objectives, and activities for each part. Part one is concerned with fossil fuels and part two with the history of energy in Iowa. Both sections include energy conservation activities. Two annotated bibliographies, one for teachers and the other for students, are also included. The teacher is provided with ditto and transparency master pages to use in the classroom. An evaluation sheet and a listing of resources are also a part of this activity packet. Revisions include updated background information and statistics, five additional activities involving solar energy and energy in general, plus a revised bibliography. (Author)

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ENERGY

Conservation Activity Packet

Grade 5

Sponsored by:

Iowa Energy Policy Council

and the Iowa Energy Extension Service

in cooperation with

Iowa Department of Public Instruction

Revised-1980

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ENERGY CONSERVATION ACTIVITY PACKETS

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INTRODUCTION TO ENERGY PACKETS

The energy shortages and emergencies with which we are faced attest the treatment humans have given to their natural surroundings. Not only do we experience personal inconveniences, but we also see severe economic and environmental consequences. Our nation has arrived at a time when it needs to reevaluate where it is going, at what speed, and how it will eventually arrive at that goal. The National Academy of Sciences generally agrees that the reserves and resources of domestic oil, gas and coal will satisfy energy needs in the United States until the year 2000. Presently the United States doubles its energy consumption every 13 years. In 1975, electric companies burned 507 million barrels of oil to generate electricity, 500 million barrels were burned to heat factories. Much of the oil and natural gas consumed could be replaced by coal, thus drastically reducing oil imports.

The instructional program in a school can examine this energy situation with reason and logic. When a social issue is integrated into the total curriculum, it helps children to apply what they are learning. The educational process can help students become aware of the alternatives and consequences in regard to energy, then guide them to choose a value. Students can learn that it is just as exciting to make something last as it is to develop something new.

Through use of the enclosed materials and activities, it is our intent to stress a conservation ethic. The conservation ethic means more than turning lights off; it has wider implications such as developing new industries to recycle metals, making more durable products, and prioritizing fuel uses.

Our values show what we tend to do with our limited time and energy. They are related to the experiences that shape them. In order to help children develop clearer values, teachers must help them use the process of valuing.

Choosing	(1)	freely
	(2)	from alternatives
	(3)	after thoughtful consideration of the consequences of each alternative
Prizing	(4)	being happy with the choice
	(5)	willing to publicly affirm the choice
Acting	(6)	doing something with the choice
	(7)	repeatedly, incorporating in some pattern of life

Students become much more purposeful when they have been given opportunities to clarify their values.

Each packet contains values clarification exercises designed to carry out the stated objectives. The teacher may wish to use a specific model to

develop more exercises. You will find that the valuing process is another tool for the teacher. When used, it leads children from apathy and confusion toward positive learning and life-styles.

The goal of providing the types of activities, which have been included, is to create a growing awareness for the need of dealing with existing energy problems in a positive way. Individual teachers should select objectives which they feel reflect the needs of a particular class. Each packet contains an energy goal and an awareness or accommodation objective. It is imperative to include objectives from each conceptual area as the purpose of these packets is to develop an energy conservation ethic within the students of today that they may become conserving and concerned citizens of tomorrow. Changes may not occur immediately due to home and parental values; however, as they become adults, this learning will show its effects.

Each packet includes many activities for the teaching towards the stated objectives. Teachers need choose only those activities which they feel will accomplish their objectives. As there are often many activities suggested for an objective, the teacher may choose to prepare and offer multiple activities. This could allow students to choose the activity they find most interesting. The teaching of energy and its conservation is designed to be interdisciplinary in order that students see that energy cannot be isolated from our daily lives. This is also important in developing the conservation ethic.

Within the packet, teachers will find transparencies, posters, filmstrips, etc. which may add to the teaching of energy and development of conservation. (These supplementary sheets are grouped together at the end of the notebook behind the colored divider page.) These visual materials plus the activity sheets can be adapted for many uses beyond those suggested, even though a variety of presentation methods is inherent in the notebooks. For example, class, small group, individual, and even family activities are included. In fact, each packet has at least one student interest center or learning station sheets included in the supplementary sheet section. Suggestions and criticisms from teachers, consultants, etc. would be appreciated and considered in keeping these packets suitable for the majority of school systems.

Most young children (7-11) years are in the concrete operational stage as named by Piaget. Such students consider real, concrete things in a systematic, but not abstract manner. Therefore, the activities which have been proposed reflect this and provide for greater awareness, rather than a formal study of energy. Individual teachers know their students best and will need to select items which they feel will be of greatest benefit to the education of the children. This is also the reason the concepts and objectives for the primary grades (K-2) have been combined in one packet. There are some classroom activities which require about 20 minutes each, some 40 minutes, and there are also some activities which can be done at home in order to enable children to work with their families.

AN OVERVIEW OF THE CONCEPTUAL DEVELOPMENT OF
K-6 ENERGY PACKETS AT A GLANCE

ENERGY GOALS

K-2 The learner becomes aware that all living things require energy.

The student becomes aware of sources of energy within the learner's home and school.

The learner becomes aware of uses of energy.

Grade 3 The learner develops an understanding of how energy affects our lives. (Packet A, Goal 1.00)

The learner examines the available energy sources. (Packet B, Goal 1.00)

Grade 4 The learner becomes aware that energy can be changed from one form to another - conversion. (Packet A, Goal 1.00)

The learner considers energy, its production, use, and conservation as essential in the maintenance of our society as we know it. (Packet B, Goal 1.00)

Grade 5 The learner develops an understanding of fossil fuels and uses. (Packet A, Goal 1.00)

The learner recognizes the involvement of energy in Iowa's past, present, and future. (Packet B, Goal 1.00)

Grade 6 The learner recognizes limits of energy sources. (Packet A, Goal 1.00)

The learner develops an understanding of alternative sources of energy. (Packet B, Goal 1.00)

Personal Awareness or Accommodation Goal

All packets focus on encouraging the development of a conservation ethic. The Personal Awareness or Accomodation Goals are "Goal 4.00" in the white K-2 notebook and "Goal 2.00" in both packets, A and B, within the 3, 4, 5 and 6 grade level notebooks. Activities in this section encourage students to question the personal importance and implications of that which has been experienced. They utilize the values clarification approach described by Raths, Harmin, and Simon in Values and Teaching.

ENERGY CONSERVATION ACTIVITY PACKETS

GRADE 5

PACKET "A"

TEACHER BACKGROUND MATERIAL
Grade 5 - Packet "A"

Fossil fuels--coal, oil, and natural gas--resulted over a very long period of time when plants died, decayed, water flowed over them, and pressure along with heat and bacteria changed the plants. It has been estimated that the average American each day uses the following energy sources:

13.6 pounds of coal
3.3 gallons of oil
297 cubic feet of natural gas
3.7 kilowatt hours of hydroelectric power
.7 kilowatt hours of nuclear power

In a lifetime, an American consumes 170 tons of coal, 2,000 barrels of oil, and 7.5 million cubic feet of natural gas. In the year 1900 Americans used 25% of the amount of energy we use today. In the year 2000 people will use twice as much as they use today at the present rate of growth.

Petroleum is found in porous rock beneath the earth's surface. Drilling for oil requires a great amount of human and machine energy. The U.S. presently does not produce enough oil for its energy needs and one-third of the oil it uses is imported from foreign sources. Oil is not only used for space heating and gasoline for cars, etc., but it is also used as a raw material in fabrics, plastics, medicines, fertilizers, etc. Of the known world oil reserves, the Middle East has nearly two-thirds and the U.S. less than 9%. Petroleum comes from the Greek word meaning "rock oil." Pitch, a form of petroleum, has been used since ancient times as a mortar, grease, etc.

Natural gas is the cleanest burning of the fossil fuels and the most convenient to produce and use. It is also the least damaging to the environment. Natural gas, too, is trapped in layers of rock, often found with oil deposits. The methods of recovering natural gas are expensive and sometimes more energy is expended to recover the gas than the energy produced. It is used by industrial and commercial concerns and is used directly by 44 million homes for heating, cooking, and cooling.

Coal is the most abundant fossil fuel in the U.S. Coal is mined by either one of two methods--stripmining or underground. Cost of land reclamation is now a portion of the overall cost of coal production. Coal must be combusted to release its stored chemical energy. The release of sulfur dioxide during combustion can create an enormous health hazard. Underground mining is dangerous and presents other health hazards. Surface mining disrupts the soil structure and changes the natural contours of the land.

Many of the activities in the 5th grade packets require between 20 and 40 minutes depending upon the length of discussion. Some of the activities require research and/or group work and are long-range in nature. There are also activities which are designed to be done at home and follow-up provided in the classroom.

GOALS AND OBJECTIVES IN ENERGY CONSERVATION

Grade 5 - Packet "A"

Energy

Goal 1.00 The learner develops an understanding of fossil fuels and uses.

The learner:

1.1 Recognizes how a fossil fuel is formed.

1.11 Discovers how sun, air, water, and organic material play roles in the formation of fossil fuels.

1.2 Realizes that the formation of fossil fuels is slow.

1.3 Understands the burning qualities of fuels.

1.4 Becomes aware of how fossil fuels are utilized.

1.5 Begins to realize that fossil fuels are non-renewable.

1.6 Develops an energy flow concept.

Personal Accommodation

Goal 2.00 The learner will develop a conservation ethic in regard to energy.

The learner:

2.1 Acquires experience in making decisions and accepting the consequences of the decisions.

2.2 Expresses personal value that is received from energy conservation.

2.3 Chooses activities which will utilize energy conservation in making contributions to the school and community.

2.4 Investigates methods concerned citizens use to improve the future of energy solutions.

2.5 Develops an idea of the type of life-style desired in consideration of the amount of energy required.

2.6 Explores the implications of a life-style in his/her home and community that results from an energy conservation ethic.

ENERGY ACTIVITIES
Grade 5 - Packet "A"

Goal 1.00 The learner develops an understanding of fossil fuels and uses.

Objective 1.1 The learner recognizes how a fossil fuel is formed.

A. Obtain samples of oil and coal and examine them with the class. Observe and record the characteristics of the samples. (1.1)

B. Prepare a hypothetical time line showing the formation of coal. (1.1)

Objective 1.2 The learner realizes that the formation of fossil fuels is slow.

A. Write a letter to a major oil company asking if they have any materials which depict the natural processes by which their energy source was formed. (1.1, 1.2, 1.4)

B. Take a field trip to a coal mine to find out more about what coal is and how it is taken from the ground. This would be an excellent activity to precede the next two activities. If a field trip is not feasible, use the filmstrip of coal mining. (*Filmstrip #1 - Part A*, Script pp. a-b). (1.1), 1.2)

C. Create a fossil fuel display. Exhibit labeled samples, and include booklets, reports, etc. resulting from research and careful planning. (1.1, 1.2)

D. Construct a chart showing the formation of fossil fuels (coal, oil, gas) from the original plant or animal life to discovery by man. (1.1, 1.2)

E. The class prepares a bulletin board using graphs, pictures, charts, and maps about fossil fuel types, fossil fuel use, fossil fuel pollution, and fossil fuel reserves. (1.1, 1.2, 1.3)

F. Credit: Living Within Our Means: Energy and Scarcity, Environmental Education Instructional Activities, K-6, The University of the State of New York, The State Education Department.

Play a variation of "Hangman." On the chalkboard instead of writing the first and last letters of a word, make drawings like the ones below:

Ask the students to suggest the drawings that should be in the spaces between the sun and the automobile. As children suggest correct responses, have them make the drawing in the space. Incorrect responses are used to build the "hangman." (Correct responses are sun, plant, protozoans, sedimentary rocks containing oil, oil, and automobile.) Discussion should lead to the understanding that the energy to drive a car came from the sun via green plants.

Have the children do research to find out how fossil fuels were formed long ago. Place a drop of oil on a piece of igneous rock (granite), a sedimentary rock (sandstone or limestone), and a metamorphic rock (gneiss or marble). Which absorbs and stores the oil? (The sedimentary rock because it is porous.) (1.1, 1.2)

1. Why is oil called a fossil fuel?

2. What are other fossil fuels? How was coal formed? How was natural gas formed?

3. Are fossil fuels still being formed? If so, why are we concerned about the depletion of fossil fuels?

G. Contact your local gas company to find out where your community's gas supply comes from and what happens to it before it reaches you. Using diagrams, make a bulletin board display to show this flow of natural gas. The class could add scenery and cutouts of their own homes, schools, stores, and industries.

Cutouts and a booklet can be obtained free of charge from American Gas Association, Education Services, 1515 Wilson Boulevard, Arlington, Virginia 22209. Ask for "Natural Gas Serves Our Community Kit"--NO0160. The companion booklet, "Natural Gas Serves Our Community Booklet"--NO0165 is also available. (1.1, 1.6, 1.2)

Objective 1.3 The learner understands the burning qualities of fuels.

A. Credit: Energy Activities for the Classroom--1976, Herbert L. Coon and Michele Y. Alexander, ERIC Center for Science, Mathematics, and Environmental Education, Ohio State University, 1200 Chambers Road, Columbus, Ohio 43212.

Make arrangements with a science teacher to have him/her or one of his/her students work with your class to examine the burning qualities of several different substances. While the testing can be done in any classroom, the ideal arrangement would be to take the class to a high

school laboratory for the experiments. Plan to burn several substances such as a: (1) candle, (2) wooden splint, (3) sliver of very soft coal, (4) kerosene (lamp), (5) alcohol (lamp), and (6) natural gas in a Bunsen burner (if possible). As each substance is burned they should respond to the questions on *Data Sheet #1*, pg. c. (1.3)

If the Bunsen burner is available, the superiority of natural gas over the other substances will be easily apparent. Without the burner, the exercise will illustrate some of the problems of using coal as a fuel. Discuss results. (1.3)

B. Have groups of students contact utilities and industries to find out what fuels they burn, why, and whether they need to add equipment to meet air quality standards. (1.3)

C. Have a group of students read "The Best Present of All," a reprint from Ranger Rick, and then either present it as a play or as a puppet show to the rest of the class. It explains about the fossil fuels in a most entertaining way. A single free copy of the reprint can be obtained from National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, D.C. 20036. (1.3)

Objective 1.4 The learner becomes aware of how fossil fuels are utilized.

A. Credit: Energy for Today and Tomorrow, San Diego City/County Schools Energy Education Committee, Department of Education, San Diego County, 6401 Linda Vista Road, San Diego, California 92111, 1975.

As a reading exercise, or at an interest center, provide copies of *Masters #1, 2*, pg. d-f. The students learn more about petroleum and natural gas through means of a story where they fill in blanks, and through the use of a crossword puzzle. (*Answer Key*, pg. g) (1.4)

B. Research the types of uses of each fossil fuel--to see that it is important to conserve them for more than heating purposes. Students could incorporate their findings into a bulletin board display. (1.4)

C. Students could prepare dioramas of how fossil fuels are used. Short reports could be attached to the diorama displays. (1.4)

D. Display items such as styrofoam, pieces of plastic, plastic records, lipstick, candles, vaseline, etc. as an interest center. Include stimulation for

students to research to find out why these are included in a study of fossil fuels. See *Student Interest Center #1*, pg. h-i for suggestions for student action cards. (1.4)

Objective 1.5 The learner begins to realize that fossil fuels are non-renewable.

A. A hands-on lesson will help the students gain a better understanding of the idea of non-renewable. The teacher brings a half dozen balls, jumping ropes, boxes of crayons, or other objects and asks the students to count them. Two students come forward to select an item, then three more are also invited to take objects. The students are then asked what is happening to the supply and are reminded that it is limited. When one item is remaining, the rest of the class is invited to come forward to select their share. (1.5)

1. Why can't everyone have an object?

2. Lead the discussion into the idea of "non-renewable."

B. Debate the pros and cons of using fossil fuels. This could also be a panel discussion including students, parents, utility representatives, etc. (1.5)

C. Divide the class into four groups of detectives and assign each group an area of the classroom. Each group is responsible for compiling a list of the different objects in their area and finding information about the natural resources used to make each object. Resources for research would include books, encyclopedias, and the school custodian. Use *Data Sheet #2*, pg. j, for gathering information. (1.5)

1. Which of the resources on your list are renewable?

2. Are any of these becoming scarce? Is the government or industry doing anything to improve the situation?

D. Divide the class into groups to research oil and natural gas. Then bring the groups together for a discussion. Guide the discussions to what it would be like if we did not have oil and natural gas, or if we had very little coal. These ideas could be summarized in chart stories or reports. (1.5)

Objective 1.6 The learner develops an energy flow concept.

A. Use *Transparency #1*, pg. k. Discuss that energy is neither created nor destroyed--it is converted from one form of energy to another. In the conversion

process all the energy is always converted to a usable form. For example, when converting heat energy to mechanical energy, heat is lost to the environment. (1.6)

B. Use a map of your community. Have the students trace the flow of energy in and out of the community. Invite resource people into the classroom to explain this flow of energy in and out. (1.6)

C. Students could choose an activity (or machine, industry, product, etc.) and trace the flow of energy. These could be displayed pictorally or in simple line drawings.

Example: sun-corn-pig-farmer-packing plant-truck-store-meat

Then discuss whether some of the steps could be eliminated, if that would save energy, and what efforts they will make to reduce these steps in their own families. (1.6)

Goal 2.00 The learner will develop a conservation ethic in regard to energy.

Objective 2.1 The learner acquires experience in making decisions and accepting the consequences of the decisions.

Objective 2.2 The learner expresses personal value that is received from energy conservation.

Objective 2.5 The learner develops an idea of the type of life-style desired in his/her home and community that results from an energy conservation ethic.

A. Values Continuum--Values Clarification Activity

Identify an issue (see suggestion or make up your own) and draw a long line on the board; then place the two polar positions and mark a series of points along the continuum. Say, "Between the end points there are many positions. I am going to whip around the room and ask you to tell me where you stand on this issue. Briefly describe your position without giving reasons. Later you can share your reasons. You may pass if you wish."

If clustering occurs, you may wish to have the students write their answers on a piece of paper and randomly select a few to be placed on the board. A discussion takes place on each presented issue. (2.1, 2.2, 2.5)

Suggestions

1. What do you know about fossil fuels?

FUELS FOREVER :::::::::::::::::::::::::: MORE FUELS NEVER

2. Where does Iowa get its energy?

IMA INDEPENDENT ::::::::::::::::::	DOLLY DEPENDENT
(no outside sources of energy needed)	(depends on outside sources of energy)

3. How should we use our energy?

FUELISH ::::::::::::::::::::::::::	CAVEMAN
FRED	CAL
(use, use, use)	(don't use any)

4. Who solves the problem of an energy shortage?

CALCULATING ::::::::::::::::::::::	EVERETT
CONGRESS	EVERYBODY

B. Values Focus Game--Values Clarification Activity

First have the students write completions to several stem sentences. After the students have completed the unfinished sentences, they are arranged in groups of three. Each student in the group is to have full attention (focus) of the other two members of the group for five minutes. During this period he/she is to talk about his/her responses. All action is to be governed by three rules. The teacher provides each student with a copy of the rules. *Master #3*, pg. 1. (2.1, 2.2, 2.5)

Suggestions for Stem Sentences

1. I feel people use fossil fuels...
2. I feel we should use...for heating our homes.
3. A more efficient way to use our electricity is...

C. Strongly Agree/Strongly Disagree--Values Clarification Activity

With this activity the student is not allowed to take a neutral stand. The teacher provides the students with a worksheet containing a series of belief statements (*Master #4*, pg. m). The students complete the worksheet individually then the teacher breaks up the class into groups of three to share and discuss their responses. The Values Focus Role (*Master #3*, pg. 1) may be used for the discussion. Indicate that there is no correct way to answer these statements. (2.1, 2.2, 2.5)

D. Removing Barriers to Action--Values Clarification Activity

This particular activity is designed to help students identify and remove barriers to action. The teacher

asks students to write at the top of a paper some action regarding energy they would like to take or decision they would like to make. This should be an action which they are having some difficulty taking. Then they should draw a line lengthwise down the middle of the paper. On the left-hand side of the paper they are to list all the imagined or real barriers which seem to be keeping them from acting (these can be from inside and outside themselves). On the right-hand side they should list steps they could take which might help remove or reduce the barriers. Once this has been done they should use the back side and develop a plan of action for actually removing the barriers. This activity can be done individually or in small groups. (2.1, 2.2, 2.5)

Example

Recycling cans, glass, and paper

takes too much time

need extra space for storing

take extra trip to recycling center

people think I'm strange

plan trip to center at
1. same time as taking another trip
2. work to convince city garoage disposal units to pick up these things for recycling

Objective 2.3 The learner chooses activities which will utilize energy conservation in making contributions to the school and community.

Objective 2.4 The learner investigates methods concerned citizens use to improve the future of energy solutions.

A. Have the students use the play, "Energerus and His Energy Kingdom," (*Play #1-9*, pp. n-u), in order to learn more about energy conservation. It can be used as a reading exercise. Perhaps the class can develop its own play using personal experiences. (2.3, 2.4, 2.5)

B. Students listen to radio and TV commercials to find out what citizens are urged to do in order to conserve energy. Discuss in class, then have students develop their own action projects to encourage people to conserve. They could prepare radio and TV commercials and then contact the local radio and TV stations to see whether they can present a short program. (2.3, 2.4, 2.5)

C. Students check recent magazines and newspapers to find notices about energy conservation. They could discuss these and write to the editors of the publications indicating support or suggesting other ways to convince people to conserve energy. (2.3, 2.4, 2.5)

D. Windows and Window Treatment Management Discussion and Observation

Windows provide daylight for task and general lighting inside a house as well as for informing the occupant of outside activities and weather. In addition to these benefits, windows can be planned and the window treatment (draperies, shades, blinds, shutters) managed to make use of the sun's energy to heat or cool the home. The goal is to collect solar energy during times of direct sunlight. If this heat is saved (or stored), it can be used later when the sun is not shining. However, during very warm seasons, the windows are generally shielded from the sun's direct rays because extra heat is undesirable.

Help the students to realize such ideas by discussing:

1. Purposes of windows.
2. When it is desirable to collect heat from the sun and why.
3. When the sun's rays should be blocked and why.
4. The seasonal differences of the angle of the sun's rays.

To make the students more aware of their surroundings, of the solar potential, and of energy conservation efforts, have them observe window treatments at home and school. Consider the following questions.

1. What window treatments (draperies, shades, blinds, curtains) are used?
2. How are the window treatments adjusted?
3. Is there a lining?
4. Can you see through the window treatment?
5. Does light pass through? Describe how much light enters.
6. How well does it block out the cold air?
7. Try to watch to see if the window treatment is adjusted during the day and why.

Discuss the students' observations. As a summary ask, "What do you do to assist the sun with its efforts?" (2.3)

Objective 2.6 The learner explores the implications of a life-style in his/her home and community that results from an energy conservation ethic.

A. If a cooperative solar home owner is available in your area, students can learn from visiting the home. (To

learn of solar home owners, try calling the State Solar Office at 515/281-8071 or the County Extension Office.) The owners may be more receptive to hosting a pair of students rather than the class. Before going, have the students prepare questions. Possibilities are: Could you describe the home and solar system? After moving in, what changes did you make in the way you live? What do you like best about the house? What do you like least about the house? How have you saved energy by living there? (2.6)

ENERGY CONSERVATION ACTIVITY PACKETS

GRADE 5

PACKET "B"

TEACHER BACKGROUND MATERIAL
Grade 5 - Packet "B"

Fifty years ago coal mining in Iowa flourished but today there are only a few mines remaining. However, interest in coal is causing new interest in Iowa's coal. Coal is Iowa's only naturally occurring fuel with large reserves. Other potential fuel sources in Iowa are oil (a small amount was found near Keota in Washington County) and energy from agricultural products. Oil can be obtained from manure and cornstalks or cobs but the processing is expensive. Solar and wind sources for energy are also promising for Iowa. Passive solar applications (residential and commercial) have proven to be cost effective at the present time. However, other solar technologies may not be major contributors for at least a decade.

Iowa's coal is sufficient to supply the coal needs of the U.S. for six years and in Iowa it would last about 500 years. Iowa has large amounts of coal but it is not easy to find and mine due to variable layers. Some of the coal seems are seven feet or more in thickness but some are less than one inch thick and less than a few 100 acres.

Nuclear energy supplies about 27% of Iowa's energy needs. Three plants--Duane Arnold Energy Center at Palo, Iowa; Cooper Nuclear Station at Brownsville, Nebraska; and the Quad Cities Station at Cordova, Illinois--supply Iowa. However, concerns have been raised as to safety, radiation, and disposal of waste. Geothermal energy has not been found in Iowa and hydroelectric power produces only 1-3% of Iowa's energy consumption.

About 98% of the fuels used in Iowa are imported. Coal is the only source native to Iowa, yet of the amount used in the state in 1979, only 5% came from Iowa with the rest being imported.

Coal use in Iowa began in the mid 1800's and coal was not really mined, as we think of mining, just picked up from exposed seams which were along river valleys. Once the coal was picked up it was transported to a local home or commercial operation by mule. Until the early 1880's all mine work in Iowa was accomplished by human or animal labor. Several types of mining then took over. In 1917 there were about 18,000 people employed in mining coal but by 1976 there were less than 100. At one time 450 mines operated in Iowa, now there are only six in operation.

In the summer of 1980, there was one underground mine in operation in Iowa near Lovilia. Five strip mines, also in south central Iowa, are in operation. All the mines are currently in a "state of flux" according to Marvin Ross of the Iowa Mines and Minerals Division of the Department of Soil Conservation. This low production is basically a result of the air quality standards which restrict the marketing of Iowa coal. It is hoped that the opening of two coal purification plants near Lovilia in the fall of 1980 will facilitate washing the coal to increase it's marketability.

Some of the Iowa coals contain as much as 7% sulfur when mined, and therefore are not environmentally acceptable as fuels. Cleaning methods can be used to reduce the sulfur content; however, in the past these have been extremely costly. Iowa State University in Ames has

a coal preparation plant where coals are tested to determine how they respond to purification efforts through the Iowa Coal Project. The process used involves a physical separation of the coal from the refuse based on the difference in density of the particles. After being crushed to 1½" pieces, the coal is put into a solution of water and magnetite powder. Straining, washing, and various physical processes separate the coal from the sulfur, clay and rocks. The process successfully cleans Iowa coal because the sulfur content of the coal as it enters the plant ranges from 3 to 11 percent, but after being purified the sulfur content is from 2½ to 3 percent.

Another environmental problem associated with coal is the effect of strip mining. Acid spoil could leave large areas with little vegetation but proper planning can prevent most problems. In Iowa in the spring of 1975, legislation was passed which should guard Iowa's environment if surface mining continues. After mining is complete a vegetative cover must be established, the operator must post a bond to insure the mined acreage will be reclaimed, and application for mining permits must include plans for rehabilitation. New mines in Iowa will most likely be strip mines but deep mines will probably be the source of most of Iowa's coal. The Iowa Coal Project in Ames also has researched strip mining and land restoration in addition to coal purification. A 40 acre mine site was operated from 1975 to 1977 in southeast Iowa. About 140,000 tons of coal were mined from a former hillside pasture. The land was then restored, including terracing, and it consequently became more productive after a year than adjacent, undisturbed land. The underground water table is restoring itself as is the plant and animal life. Thus, with proper post-mining land management the agricultural potential of the land is not lost.

Many of the activities in the 5th grade packets require between 20 and 40 minutes depending upon the length of discussion. Some of the activities require research and/or group work and are long-range in nature. There are also activities which are designed to be done at home and follow-up provided in the classroom.

GOALS AND OBJECTIVES IN ENERGY CONSERVATION

Grade 5 - Packet "B"

Energy

Goal 1.00 The learner recognizes the involvement of energy in Iowa's past, present, and future.

The learner:

1.1 Investigates the sources of energy in Iowa.

1.2 Investigates the uses of energy in Iowa.

1.3 Becomes aware of future sources of energy in Iowa.

1.4 Recognizes that Iowa's economy is related to the availability and use of energy.

Personal Accommodation

Goal 2.00 The learner will develop a conservation ethic in regard to energy.

The learner:

2.1 Acquires experience in making decisions and accepting the consequences of the decisions.

2.2 Expresses personal value that is received from energy conservation.

2.3 Chooses activities which will utilize energy conservation in making contributions to the school and community.

2.4 Investigates methods concerned citizens use to improve the future of energy solutions.

2.5 Develops an idea of the type of life style desired in consideration of the amount of energy required.

2.6 Explores the implications of a life style in his/her home and community that results from an energy conservation ethic.

ENERGY ACTIVITIES
Grade 5 - Packet "B"

Goal 1.00 The learner recognizes the involvement of energy in Iowa's past, present, and future.

Objective 1.1 The learner investigates the sources of energy in Iowa.

A. Examine samples of oil and coal. This can be a review of Packet "A" or portions of Packet "A", especially pages 4-5, could be inserted at this point. (1.1, 1.2)

B. Use *Transparencies #1, 2*, pp. v-w, in leading a discussion about the location of oil, coal, and gas fields in the United States. Pay close attention to any sources which may be in Iowa. (1.1)

C. On a map of Iowa, identify the location of coal, oil, or natural gas deposits. Students could begin a folder which would contain information on Iowa's energy, or this could be a chapter of a complete Iowa folder. (*Transparencies #3, #4*, pp. x-y). (1.1)

D. Show a map of Iowa's minerals. Make a bulletin board using the map. Show where each mineral is obtained and where abandoned mines are located. Children write to the major mining companies to find out methods of mining, energy used in the process, products made from the minerals, and what they feel will happen when the resources are depleted. Maps showing Iowa's minerals may be obtained from the Iowa Geological Survey, 123 North Capitol Street, Iowa City, Iowa 52242. (1.1, 1.2)

E. Show slides or pictures of Northern Natural Gas Company's pumping station, petroleum product storage tanks in Polk County, Solid Waste Recovery, the Duane Arnold Center, etc. (*Filmstrip #1 - Part B*, Script on pp. z-aa). This will provide the students with an idea of energy sources available in Iowa and to Iowans. (1.1)

F. Students may be interested in studying and singing songs written and sung by coal miners. "Sixteen Ton" is appropriate, as are many others. Study the words to find out about a miner's life. (1.1)

G. Study the ways electrical energy is produced in the state. (1.1)

H. Show the film, "The Last Pony Mine," which was produced and directed by Richard Kraemer of Iowa State University. The film documents the final days of the Iowa coal mine which was the last such country mine in the U.S.A. The

booklet, Iowa's Coal Mining Heritage, written by Dorothy Schwieder and Richard Kraemer in 1973, is usually sent with the film to provide supplementary material. (See the media bibliography for ordering details.) (1.1)

Objective 1.2 The learner investigates the uses of energy in Iowa.

A. Use *Transparency #5*, pg. bb, which shows distribution of Iowa's Energy Consumption. Discuss with the class. Then show *Transparency #6* pg. cc, which indicates the growth of energy consumption in Iowa. This should provide the students with a clearer picture of Iowa's energy uses. (1.2)

B. Have students describe both the present and historical uses of the windmill. Research should be done, a visit to a farm with a working windmill could be arranged, or a farmer invited to visit the class and explain uses he has made of the windmill. Discuss use of wind energy--advantages, disadvantages. It would be helpful to use the December, 1975 issue of National Geographic with the article, "New Energy from an Old Source: The Wind," by Roger Hamilton and Emory Kristof, pp. 812-829. (1.2)

C. Students discuss how farmers use energy in order to produce food. How have farmers increased their energy use? Has this increased the amount of food they can produce? (Consider fertilizers, larger machinery, etc.) If it is possible, invite a few farmers to share with the class what types of energy they use and how they use it in agriculture. Show the film, "Seeds of Survival," from the Living History Farms, Rural Route 1, Des Moines, Iowa 50322. (See bibliography) (1.2)

D. Visit the large energy users in your community such as factories and industries. Have them discuss how they use energy, where they get their energy, and what they are doing to conserve energy. If it is not possible to visit these places, invite representatives from them to the classroom. (1.2)

E. Inventory your home block (or apartment floor, or farms along your road) to determine the percentage of homes using the various types of energy. Use *Data Sheet #1*, pg. dd, for your collection of information. (1.2)

F. Construct a mobile of ways Iowa uses energy. It should include agricultural, residential, commercial, and industrial areas. (1.2)

G. Research possible energy reasons why cities in Iowa are located where they are. (You might choose to investigate those in your county instead.) Check the county courthouse for early maps and talk to people who know some of the history of your county. (1.2)

Objective 1.3 The learner becomes aware of future energy sources in Iowa.

A. Contact the Iowa Energy Policy Council and other interested organizations to learn what is being done in Iowa to utilize alternative energy sources. The Council's Sixth Annual Report to the Legislature, January 15, 1980, states that: "Solar energy, which includes not only direct radiation, but also wind, wood, hydro and biomass, can combine to contribute a growing portion of Iowa's energy budget." Students can benefit from learning about such energy alternatives to conventional fuel sources. CURE (Citizens United for Responsible Energy) can suggest volunteer speakers around the state for topics such as wind or solar energy, alternative fuels, underground housing, conservation and more. See the Teacher's Bibliography for a description of the resources and services of the EPC and CURE. (1.3)

B. Students prepare display/displays of the types of energy sources Iowa could depend upon in the future. Prepare a program of Iowa's future energy sources. Try including slogans, slides of models, songs, poems, commercials, skits, etc. (1.3)

C. After research into the types of alternative energy courses, have the students design models of these sources which could be used in Iowa. This could be done jointly with grade 6 as they do extensive research into alternative energy sources. Once the models which could be used in Iowa have been made, displays could be developed for use in public buildings. (1.3)

D. Searching for Sun Facts can be an interesting project. Students enjoy finding facts about the sun as a star. Challenge them to present their findings in the form of a board game, flash cards, or a quiz bowl to share with classmates. (1.3)

E. Keeping a Sun Diary is an activity that can enlighten students about the changes of the position of the sun relative to the earth. An understanding of this relationship is a prerequisite for serious utilization of solar energy because the altitude of the sun affects the amount of direct sunlight that can be absorbed. Some activities students could pursue to gather information are described below. Data should be recorded, charted, and summarized. (1.3)

1. Record the times the sun rises and sets. (Television weather reports give this information.)
2. Measure an indication of the sun's altitude in the sky.

A simple way to learn about the sun's altitude is to measure the length of a shadow cast by a stationary post or peg. This should be done at designated times during the day such as 9 a.m., noon, and 3 p.m. to see the variation during a day. An easy method utilizes a wooden stake or peg driven into a sunny corner of the playground. A long shadow is cast when the sun is low in the sky with a short shadow at noon. Such data could be collected over at least two days to convince students that the daily variations of the sun are consistent.

To help students associate the altitude of the sun with the length of the post's shadow, conduct the following preparatory activity. Use an electric light to demonstrate how the height of the light source affects the length of the shadow of a pencil or dowel stick.

3. The activities 1 and 2 above could be expanded to include the factor of seasonal changes in the position of the sun. By recording the length of the post's shadow during the same two days each month, the students could observe how the sun becomes lower in the sky in the winter months than in the late spring, summer, or early fall months. A summary discussion could include the ideas of how the variation in the position of the sun in the sky between seasons affects the amount of energy potentially available to us from the sun.

F. Energy Riddles - Creative students will enjoy writing energy riddles, especially after experiencing some of the previous activities. Try having a "Riddle of the Day". All areas of energy resources, Iowa's resources, and conservation efforts are possible topics. (1.3)

Objective 1.4 The learner recognizes that Iowa's economy is related to the availability and use of energy.

A. Research how Iowa grew--what sources of energy caused the largest growth? Consider the sun for agriculture, and coal for industry. What would happen in Iowa if other sources of energy were not available? (1.4)

1. What kinds of jobs would be eliminated?

2. What kinds of jobs would become available?

3. Which industries would have to leave?

B. Compare a pioneer Iowa and its use of energy to present-day Iowa. Compare life styles and uses of energy. This could include a trip to historical locations in the study of life long ago. (1.4)

C. Write a speech for the governor of your state. It should be a speech he or she could use in addressing the legislature on the effect of energy use on the state's environment. The speech could also include proposals for ways the state's citizens could work together on energy conservation. (1.4, 2.4, 2.5)

D. Compose songs (use tunes from popular songs or compose your own) and poems which describe energy in Iowa and what can be done about energy conservation. (1.4, 2.4) See *Energy Lyrics*, pg. ee.

E. If possible, plan a field trip to observe solar energy being utilized. The following brief list should help to some extent in finding a location. (1.4) (See Activity A, 2.6, Packet A).

Raccoon Valley Bank in Adel
Solar furnaces in Indianola, Ogden, Davenport
Solar grain drying in Reinbeck, Vinton, Iowa State University
Resort in Spirit Lake
Hog house heating in Hubbard and New Sharon
Gymnasium at Scattergood School in West Branch
Business in Dubuque
Commercial building in Ottumwa

Specific addresses may be obtained from the local chamber of commerce or CURE.

Goal 2.00 The learner will develop a conservation ethic in regard to energy.

Objective 2.1 The learner acquires experience in making decisions and accepting the consequences of the decisions.

A. Contact local businesses and industries to determine how they are being effective in energy conservation measures. If the students feel letters to the editor, suggestions to the businesses and industries, and posters will help everyone do a better job, encourage them to accept an activity and follow through with it. (2.1)

B. Ask students to find explanations of why people do not wish to do without the convenience items that consume electricity. (2.1, 2.6)

Objective 2.3 The learner chooses activities which will utilize energy conservation in making contributions to the school and community.

Objective 2.4 The learner investigates methods concerned citizens use to improve the future of energy solutions.

A. Interested students could form a club or committee to monitor the energy consumed in the school and meet with the principal and custodian to discuss findings and possible solutions. (2.1, 2.3, 2.4)

B. Values in Action--Values Clarification Activity

This activity requires the students to actually become involved in a planned action to bring about some desired change and evaluate the results of their actions.

The students are asked to make a list of five changes they think would effectively reduce energy consumption in Iowa or their town. Then the teacher distributes the worksheet, "You Can Do Something About It," (*Master #1*, pg. ff). Each student completes the form by placing an (X) by any of the alternatives which he/she has ever done, and an asterisk (*) next to any he/she would consider doing.

The teacher then asks the students to select one of their five changes and determine which two actions they will take. For one month they are to actively engage in both of these actions to bring about a change. After one month the class discusses what they did and the results that occurred. (2.1, 2.3, 2.4)

C. I Urge "You" Telegrams--Values Clarification Activity

Give each student a 4" x 6" card or a blank Western Union telegram form. Ask the students to choose a real person and write a telegram to that person beginning with these words: "I urge you to..." The message is to consist of 15 words or less (or 50 words for a night letter). The student is to sign his/her name to the telegram. The telegram should reflect something about energy the sender feels is important. The students may read their telegrams to the class or tape them to the walls and take a walk to see what others have written. In order that these telegrams, and the students' efforts, are directed specifically towards energy concerns in Iowa, encourage the students to write their telegrams to real people in Iowa who would make a change and also to Iowa's representatives in Congress. (2.1, 2.3, 2.4)

D. Self Contracts--Values Clarification Activity

Tell the students they will be making a contract (agreement) with themselves about some change they would like to make in their lives in regards to energy. An example might be: "For the next week, I will turn out the lights each and every time I leave my room, thus saving electricity." Students are to

sign their name at the bottom if they really intend to carry out the contract. After one week the class can take time to share and discuss how well they are doing. The teacher should also participate in this activity. Encourage the students to make specific and realistic contracts which can be completed. (2.1, 2.3, 2.4)

Objective 2.2 The learner expresses personal value that is received from energy conservation.

A. Organize an essay contest. This could be entitled "How Can Energy Be Saved in Iowa?" (2.2, 2.3)

B. Arrange with a local radio station for students to present ideas on how local citizens could conserve energy. This could also include original songs and poems. The program could be in the form of a talk show or it could also be a play. (2.2, 2.3, 2.4)

Objective 2.5 The learner develops an idea of the type of life style desired in consideration of the amount of energy required.

A. Research the types of uses of energy today. The teacher could use a picture of an historical scene or building or utilize a field trip to a museum, historical building, or specifically a 1900 building. Compare the life styles. Which do the students prefer? Why? (2.5)

B. Rank Order--Values Clarification Activity

This activity gives students practice in choosing from alternatives and then publicly affirming their choices. The teacher explains that he/she is going to ask some questions which require them to make a value judgment. Students are given three or four choices for responding to each question and asked to rank order these choices. The question is read by the teacher, choices are written on the board, and six to eight students in turn give their rankings. Students may say, "I pass." Class discussion may follow after the teacher gives his/her rankings (if desired.) (2.5)

Rank Order Questions

1. Where would you rather live?

_____on a farm
_____in a town
_____in the suburbs
_____in an inner city

2. If you had two hours to spend with a friend, which would you do?

_____use electrical toys or games
_____watch TV
_____go for a walk
_____play checkers or board games

3. What is the most serious problem in the United States today?

_____energy shortage
_____crime
_____inflation
_____pollution

4. Which is the most economical method for traveling to work or school for you?

_____automobile
_____bus
_____walk
_____bicycle

5. If you had to go on a long trip, how would you choose to travel?

_____by train
_____by airplane
_____by ship
_____by automobile
_____by bus

6. Where would you like to spend your vacation?

_____at the shore
_____in the mountains
_____at your grandmother's house
_____camping near home

7. Which would be hardest for you?

_____live the way people did in the horse and buggy days
_____live the way you do today
_____use as many energy conservation measures each day as you can

8. Which source of energy is the best to develop?

_____solar energy
_____nuclear power
_____geothermal energy
_____fossil fuels

C. Are You Someone Who?--Values Clarification Activity

The teacher provides the students with copies of *Master #2*, pg. gg. On this sheet the students respond to each item with "Yes," "No," or "Maybe" by circling one of the symbols: Y, N, or M. After completing this, each student reads to the class one question which he/she has answered with an emphatic "yes" or "no" and tells why he/she answered that way. Then have the students make their own lists of "I Am Someone Who..." sentences. (2.5)

D. Baker's Dozen--Values Clarification Activity

The teacher asks the students to make a baker's dozen list (13) of things they personally use around the house which make use of electricity. This should include anything with plugs that they use frequently. Next, direct them to draw a line through the three things they could live without the easiest. For example, what three things could they give up most easily if there was an acute power shortage and every home was asked to cut down on its use of electricity. Then have them draw circles around the three things they would not give up until the last. Students are asked to volunteer to read their circled and crossed out items. From this exercise they could write "I Learned Statements" where they evaluate what they did and write two or three brief statements beginning with "I learned that I... ." (2.5)

ANNOTATED CHILDREN'S BIBLIOGRAPHY
Grades 4-6

BOOKS AND PAMPHLETS

Adler, Irving and Ruth. Coal. John Day Company, New York, 1965, 47 pp., $3.96. The book traces the development of coal, how it is mined, its uses, and its many by-products.

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Hoke, J. Solar Energy. Franklin Watts Publ., New York, NY, 1978, $4.90 (grades 4-6).

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Iowa Energy Policy Council. Home Energy Savings Manual is a well written booklet that provides basic energy conservation measures for the home. It has about 75 pp. and is free. Order from the Iowa Energy Policy Council, Capitol Complex, Des Moines, Iowa 50319.

Iowa Power. Several informative and clever publications are available for students through their local utility company in central and southwest Iowa. The following booklets are offered:

The Atom and the Energy Crunch. Reddy Communications, Inc., 1976. The booklet contains information on the energy crisis, what caused it, nuclear energy, and future energy sources.

Coal and the Energy Crunch. Reddy Communications, Inc., 1976. Information on sources of coal, coal's value as an energy source, problems due to use of coal, and the importance of planning ahead are discussed.

Electric Utilities and the Energy Crunch. Reddy Communications, Inc., 1976. The booklet provides information to aid in the understanding of where electricity comes from and why the supply of power is threatened.

Exploring Energy leads classes to unravel the mysteries of energy as they take on 10 different "missions". Through quizzes and games, students become agents charged to turn coal into kilowatts, fill the energy barrel, put the sun to work, and become electricity and natural gas experts.

You and Your Electric Company uses a question and answer format to present information on energy and the operation of a utility company.

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Ruchlis, Gyman. Thank You, Mr. Sun. Harvey House Publishers: New York, 1966, 45 pp. Ruchlis provides many illustrations of how the sun helps humankind and nature.

Spetgang, T. Tilly's Catch-A-Sunbeam Coloring Book. Solar Service Corporation, P.O. Box 183, Cherry Hill, NJ 08002, 1976, $1.50. (grades 2-5).

Stolp, R. N. and Deluca F. Perspectives on Iowa Coal, 1976. Energy and Mineral Resources Research Institute, Iowa State University, Ames, Iowa 50011. This colorful and readable report provides much local information as well as background material on coal mining in general. Recommended resource for junior and senior high students.

Szulc, Tad. The Energy Crisis. Franklin Watts, Inc.: New York, 1974, 128 pp., $6.95. Author reveals many disturbing items in relation to the energy crisis and why it is here. The book also contains an explanation of why the energy crisis will continue into the future.

Thomas A. Edison Foundation, Inc. Energy Conservation: Experiments You Can Do. Michigan, 1974, 32 pp. This booklet contains many energy conservation experiments designed to bring about a better understanding of how energy can be conserved at the present time.

Wohlrabe, Raymond A. Exploring Solar Energy. The World Publishing Company, 1966, 89 pp. This resource identifies early history of sun worshippers, and how the sun provides heat and light which can be turned into electricity. It also discusses the uses of solar energy for the future.

Zim, Herbert. Waves. Morrow, 1967, $3.78. This book offers a useful introduction of tidal waves and underwater earthquakes.

BOOKS: for Teacher's Background and Reference

American Association of School Administrators. School Energy Crisis: Problems and Solutions. 1977, from AASA, 1801 N. Moore St., Arlington, VA 22209, $9.95 postpaid, discounts on orders of 2 or more. This is one of the best sources of data on the impact of rising energy costs, present and future, on school operating budgets. Examples of programs to reduce energy bills without capital spending and a guide for planning an energy cost-reduction program are included.

Carr, Donald E. Energy and the Earth Machine. New York, NY: W. W. Norton and Co., 1976, $10. Many historical insights, examples of alternatives used abroad, and a strong chapter on conservation make this a book of general interest. "The Lost Art of Conservation" was also published as a magazine article in The Atlantic, Dec. 1975, pp. 59-70.

Clark, Wilson. Energy for Survival: The Alternative to Extinction. Anchor Press/Doubleday and Co., New York, NY 1975. $4.95. One of the most extensive overviews of the social, environmental, and economic aspects of energy, this is the nearest thing to an "energy encyclopedia." Senior high students and adults will appreciate its nontechnical explanations of conventional and renewable energy uses and discussions of social and economic implications of the energy transition. An extensive reference guide to other sources is included.

Commoner, Barry. The Poverty of Power. New York, NY: Knopf, 1976, $2.25. An environmentalist examines the links between use and misuse of energy, capital, and labor in this controversial book predicting that huge energy conglomerates will become extinct.

Daniels, Farrington. Direct Use of the Sun's Energy. 1975 ed. Maryland: Ballantine Books, $1.95. This is a comprehensive summary of low-cost solar applications and the research behind it. It's the best available introduction to solar technology.

Eldridge, Frank. Wind Machines. National Science Foundation, Washington, DC, 1976, 78 pp., $30. Best available overview on wind machines with photos, illustrations and diagrams. Describes history, potential, application performance and system design of wind machines.

Fowler, John. Energy-Environment Source Book. National Science Teachers' Association, revised edition, 1978, $5., 1742 Connecticut Ave., N.W., Washington, DC 20009. This is a compilation of basic facts and issues related to energy use and supply, with emphasis on fossil fuels. Quantitative information abounds in many tables and technical appendices. Math and physical science teachers may appreciate this one most but there is a sizable section on "Energy, Society, and Environment" for social science teachers as well.

Gray, Elizabeth and Gray, David D. Growth and Its Implications for the Future. The Dinosaur Press, P.O. Box 666, Branford, CT 06405, 1975,

$3. Social, ethical, and physical constraints on growth of energy use, resource consumption, pollution, population, food production and land use are discussed in a question-and-answer format accompanied by numerous cartoons. Good selected reading.

Halacy, D. S., Jr. Wind, Sun, and Water: Our Energy Alternatives. Harper and Row, Inc., 10 E. 53rd St., New York, NY 10022, 1977, 192 pp., $9.95. Easily read. The renewable resources of geothermal, water, tidal, sea thermal energy, wind, biofuels, and solar energy are presented for consideration.

Hayes, Denis. Energy: The Case for Conservation. 1976, Worldwatch Institute, 1776 Massachusetts Ave., N.W., Washington, DC 20036, $2, for a single copy. Ask for quantity discounts. This mini-book is crammed full of energy-conserving strategies as well as a strong rationale for their use. All segments of U.S. consumption are covered. For senior high students and adults.

Hayes, Denis. Energy: The Solar Prospect. Worldwatch Institute, 1776 Massachusetts Ave., N.W., Washington, DC 20036, $2. This is an excellent, detailed summary of windpower, waterpower, biomass, and direct sunlight resources and their applications now and in the future. Recommended for teachers.

Hayes, Denis. Rays of Hope: The Transition to a Post-Petroleum World. W. W. Norton and Co., New York, NY, 1977, $3.95 (ppbk). Technological, economic, and social problems of fossil fuels versus solar are presented, with solar emerging the winner. This is a very persuasive argument for using renewable energy sources, and it includes much information on applications of alternative technologies.

Hodges, L. and Neff, J. Solar Energy 1976. Report from the Iowa Energy Policy Council, Lucas Bldg., Capitol Complex, Des Moines, IA 50319. This report is interesting reading. It describes some practical applications of solar technology in Iowa.

Lemish, J. Mineral Deposits of Iowa. Iowa Southern Utilities Co. and Craftsman Press, Burlington, 1969. Excellent resource on local mineral deposits and their potentials, this one should be on every teacher's shelf.

Lovins, Amory B. Soft Energy Paths: Toward a Durable Peace. Ballinger Pub. Co., 17 Dunster St., Harvard Square, Cambridge, MA 02138, 1977, $6.95. This insightful and controversial book presents alternatives to current patterns of energy excesses and waste. Changes in decisions on how to obtain and use energy are advised as prelude to a safe, agreeable future. Information on costs and commentary on values clarify the "soft path" position. For adults.

Lovins, Amory B. World Energy Strategies. Ballinger Pub. Co., 17 Dunster St., Harvard Square, Cambridge, MA 02138, 1975, $4.95. This is a basic source of facts, issues, and options that should be read by anyone seriously interested in the energy debate and decision-making. Choices among energy sources are presented in an understandable

but technical manner. The type of society we'll have in the future, however, depends on how much energy we think we need. Recommended for teachers.

Lovins, Armory B. and Price, John. Non-Nuclear Futures. Ballinger Pub. Co., 17 Dunster St., Harvard Square, Cambridge, MA 02138, 1975, $5.95. This influential work outlines concisely the main technical grounds for ethical, social, and economic concern about nuclear power in a way understandable to most people without technical training.

Lucas, Ted. How to Use Solar Energy in Your Home and Business. Ward Ritchie Press, Pasadena, CA, $8. Includes solar heating and cooling, electric cars, and wind systems.

Mazria, Edward. The Passive Solar Energy Book. Rodale Press, Emmaus, PA, 1979, $10.95. This comprehensive volume is two books in one. It is a primer on the fundamental concepts of heat transfer by solar energy and on its practical applications illustrated by photographs and performance data of many passive solar buildings. It is also a workbook containing step-by-step instructions on designing and sizing passive solar heating systems and how to calculate heat losses and gains, performance measures, and cost effectiveness. Excellent graphics support the clear, nontechnical language of the text. Yet there is plenty of data and basic formulae to provide practical assistance to the physical science or industrial arts teachers who want to know more of the how and why of solar energy transfer and storage.

Merrill, Richard and Gage, Thomas, eds. Energy Primer. New York: Dell Publishing Co., 1978, $7.95. This updated sourcebook is a catalog of information and sources of plans and materials for use of renewable forms of energy--sun, wind, water, and biofuels. Emphasis is on homes and small-scale systems suitable for families or small communities. Many illustrations and concise factual reports sprinkled throughout. The large-scale paperback format invites student browsing. Suggestions for items to build are numerous.

Murray R. Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes. 1975, Pergamon Press, Elmsford, NY 10523, $14.50. Text cited as one of the most popular reference materials used by science teachers in North Carolina.

Pierotti, A., Keeler, A., and Fritsch, A. Energy and Food. revised, 1977, available for $6.90 from Citizens' Energy Project, 1110 - 6th St., N.W., #300, Washington, DC 20001. The authors outline energy used in production, processing, delivery, and marketing of selected food items and suggest some ways to reduce this consumption. Energy "costs" of beverages and some other common processed foods are specified.

Rothchild, John and Tenney, Frank. The Home Energy Guide: How to Cut Your Utility Bills. New York: Ballantine Books, 1978, $1.98. This is a very readable and portable paperback full of practical suggestions. A bargain!

Schmidt, F. H. and Bodansky, David. The Energy Controversy: The Fight Over Nuclear Power. 1976, Albion Pub. Co., 1736 Stockton St., San Francisco, CA 94133, $7.95 ($4.95 ppbk). This has been a very popular reference work for science teachers.

Stobaugh, R. and Yergin, D. Energy Future, Report of the Energy Project at the Harvard Business School. Random House Inc., 201 E. 50th St., New York, NY 10022, 1979, $12.95. Considering the limited prospects of other energy strategies, the authors argue for solar energy and conservation. Further, they advocate decentralized power as requiring less capital investment and producing quicker results. Comprehensive and highly readable.

Wilson, Mitchell. Energy. rev. ed. Life Science Library, Morristown, NJ: Time-Life Books, 1970, $7.95. This volume of the Life Science Library is a comprehensive, heavily illustrated book which examines energy from Galileo's discoveries to the laser beam. Sources of energy, measurement of energy, and each form of energy are discussed with the clarity typical of this series. One picture essay surveys the history and production of oil; other essays cover electrical phenomena, the power of the atom, and future power sources. A chronology recounts the history of atomic energy.

BOOKLETS

ABC's of Radiation. 1977. It is a free, 28-page booklet available to individuals sending a request to Public Affairs, Brookhaven National Laboratory, Associated Universities, Inc., Upton, NY 11973. This is clearly presented basic information about radiation from radioactive materials and nuclear reactors: definitions, measurements, risks, safety practices, and controls. Originally written for employees of a large laboratory using nuclear energy. The reading level is appropriate for advanced upper elementary students.

Basics of Solar Air Systems. It is from the Sheet Metal and Air Conditioning Industry, 1900 L St., NW, Suite 405, Washington, DC 20036. No charge. Elementary description of solar air systems, well illustrated.

Colder . . . Darker (analysis of FEA-sponsored National Survey of Household Energy Use) and Save Energy, Save Money (inexpensive conservation, insulation techniques) booklets available free from: Community Services Administration, Office of Energy Program, 1200 - 19th St., N.W., Washington, DC 20506.

Cooperative Extension, New York State, Save Energy, Save Dollars, available for $1.50 from Mailing Room, 7 Research Park, Cornell University, Ithaca, NY 14853. This collection of articles offers practical advice to homeowners, prospective homeowners, and consumers on ways to conserve energy in daily living.

Department of Energy (DOE) energy education materials are available free of charge from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. Ask for current list of

their many titles. Order in advance; two months waiting time for delivery is typical. Some representative titles are:

Careers in Energy Industries
Energy in Focus: Basic Data
The First Reactor
Flywheels: Storing Energy as Motion
Gas Mileage Guide for New Car Buyers
How to Save Money by Insulating Your Home
How to Understand Your Utility Bill
Nuclear Energy
Nuclear Power in Space
Nuclear Power Plant Safety
Sixty-Five Ways to Save Natural Gas
Solar Energy for Heating and Cooling
Tips for Energy Savers
Tips for the Motorist: Don't Be Fuelish

Department of Housing and Urban Development. In the Bank or Up the Chimney, U.S. Government Printing Office, Washington, DC 20402, Stock No. 023-000-00297-3, $1.70. This booklet is an elaborate worksheet that allows homeowners to compute costs and benefits of storm windows, insulation, weatherstripping, and other energy-saving practices. It requires 2-3 hours to complete, but provides much worthwhile information and exercises math skills at the same time.

Department of the Interior, Geological Survey. Natural Steam for Power is an illustrated fold-out brochure on one kind of geothermal power. Cost: 25¢ from U.S. Government Printing Office, Washington, DC 20402, Stock No. GPO-19740-548-685.

D.P.I., Energy Conservation in School Facilities. Iowa State Department of Public Instruction, Grimes State Office Bldg., Des Moines, Iowa 50319. Brochure lists specific recommendations for reducing energy waste in school buildings.

Eaton, William W. Energy Technology, Energy Storage, Geothermal Energy, Oil, and Solar Energy are all available free from DOE, Technical Information Center, Box 62, Oak Ridge, TN 37830. Multiple copies for classroom use will be mailed on request. Ask for a current listing of other free publications on a wide range of energy topics.

Edelson, Edward. Alternate Energy Sources is one of many useful free booklets provided to teachers by Edison Electric Institute, 90 Park Avenue, New York, NY 10016.

Energy, A Growing National Problem. Education Servicing Section, National Wildlife Federation, 1412 Sixteenth St., NW, Washington, DC 20036. Single copy free; additional 20¢ each; 50 or more, 16¢ each. The illustrated, 16-page report discusses our energy problem and solutions.

The Good News About Energy is a 49-page report of a 1979 study by the Council on Environmental Quality. It is available from the Executive Office of the President, Council on Environmental Quality, 722 Jackson

Place, N.W., Washington, DC 20006. The potential for achieving lower energy growth in the United States and the implications for the economy, the environment, and government policy are discussed.

How to Save Gasoline . . . and Money is an 8-page pamphlet on efficient driving practices. Available free from DOE Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. Ask for a list of currently available publications on energy-related topics.

Iowa Energy Policy Council. Home Energy Savings Manual is a well-written booklet that provides basic energy conservation measures for the home. It has about 75 pp. and is free. It is available from the Iowa Energy Policy Council, Capitol Complex, Des Moines, IA 50319.

Iowa Power. A series of "Q and A" booklets were developed using a format of questions and answers to discuss the content. Titles are: Gas Safety, Gas Supply, Utility Regulation, Electric Safety, Electric Supply and Profit. Each booklet is about 5 pages in length and is available to customers in the Iowa Power and Light service area in central and southwest Iowa through the local utility office.

Miller, Alan S., et al. Solar Access and Land Use: State of the Law 1977, free, from the National Solar Heating and Cooling Information Center, P.O. Box 1607, Rockville, MD 20850. This is a summary of solar access rights for various buildings depending on solar input for comfort and is part of a larger study, Legal Barriers to Solar Heating and Cooling of Buildings.

Olin, Hubert L. Coal Mining in Iowa, State Mining Board, State of Iowa, Des Moines, Iowa 50319. Early history of coal mining in Iowa and role of coal in development of the state's economy are presented.

Solar Energy - Progress and Promise. Executive Office of the President, Council on Environmental Quality, 722 Jackson Place, NW, Washington, DC 20006. The 42-page booklet discusses progress in the development of various aspects of solar energy utilization.

Your Energy World. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. This 1977 publication is for grades 4-6 and is free.

TEACHER AIDS

American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209, will send teachers free copies of their educational services newsletter, Natural Gas Energy. Reading level is adult. Each issue focuses on one topic. For example, Volume 8, No. 2 is devoted to "Fuels from Biomass." Other recent issues centered on "Synthetic Natural Gas from Peat," "Coal Gasification," "Natural Gas and the Environment," "Energy Balances." Free kits are available such as: Natural Gas Serves Our Community Kit for grades 4-5 or grades 2-3. A booklet is also offered by the title Natural Gas Serves Our Community Booklet for grades 2-3 or 4-5. Additional free booklets are:

Natural Gas - Science Behind Your Burner
Experiments: Properties of Gas and Heat Energy

How Your Gas Meter Works
Look to the Future - The Gas Company in Your Community
History of Natural Gas
The Story of Natural Gas Energy

Carey, Helen. Award Winning Energy Education Activities for Elementary and High School Teachers. 1977, available at no cost from DOE Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830.

CEL Blocks. Primary Interdisciplinary Environmental Learning Packets, Brevard County, FL. (ESEA Title III, Project #050-2323-73003). Student cards covering areas of environmental education which can be used by teachers in a variety of interdisciplinary ways.

Community Workers and the Energy They Use. National Science Teachers Association, (grade two), 1976, free. Available from DOE Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830.

Curriculum for Appropriate Technology. National Center for Appropriate Technology, P.O. Box 3838, Butte, MT 59701. $5. The packet includes a selection of ten activities about present and future energy systems. Topics covered are: Energy Production and Use, Food and Nutrition, Renewable Resources, plus Cans and Recycling. Posters, handouts, and learning games are included.

Education Packets: Wind Conservation, Solar and Chemical Energy. Simple and well described projects are suggested for upper elementary students. Obtain from: American Museum of Atomic Energy, P.O. Box 117, Oak Ridge, TN 37830.

Edison Experiments You Can Do is available for 50¢ from the Charles Edison Fund, David O. Schantz, Curator, 101 South Harrison Street, East Orange, NJ 07018. This is a collection of seven booklets describing 75 experiments related to concepts of electricity. Alternative Energy Sources, Energy Conservation, Nuclear Experiments, and Environmental Experiments are among the topics included.

Energy. Environmental Education Project, ESEA Title III, Section 306 Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, KS 66612 (ED 093 649). Objectives are listed, along with activities which meet the stated objectives. Teachers select only those appropriate to the objectives for their students.

Energy. Michigan United Conservation Clubs, P.O. Box 30235, Lansing, MI 48909. Provides information on the nature of energy, sources and uses of energy, and conservation. There are also some work sheets and ideas for helping others learn more about energy.

Energy. Social Issues Resource Series, Eleanor C. Goldstein, 1975. Social Issues Resource Series, Inc., 1200 Quince Orchard Boulevard, Gaithersburg, MD 20760. Notebook filled with reprints of articles related to energy.

Energy Activities for the Classroom - 1976. Coon, Herbert L. and Michele Y. Alexander, 1976. ERIC Center for Science, Mathematics and Environmental Education College of Education, the Ohio State University, 1200 Chambers Road, Third Floor, Columbus, Ohio 43212. Resource booklet of energy teaching activities divided into grade levels: K-3, 4-6, 7-9, 10-12.

Energy Conservation Classroom Kits 1-3, 4-6. Southern California Edison Company, 1976. Educational Services, Room 397, P.O. Box 800, Rosemead, CA 91770. Colorful kits to help teachers teach about energy conservation. There are folders, inspector cards, stickers, certificates. The teacher's guide contains ideas and lesson plans, in addition to duplicating masters.

Energy Crisis Teaching Resources. Curry, Wendell, et. al., Oregon State Board of Education, Salem, OR, 1973, 59 pp. (ED 085 316). Many very useful activities to be used in stressing individual responsibility towards energy crisis problems.

The Energy Crisis: What You Can Do About It. Standard Oil Company (Indiana), 1973. Mail Code 3705, 200 E. Randolph Drive, Chicago, IL 60601. Folder containing four spirit masters and specific teaching instructions. The spirit masters give information and ask for students to supply some interpretation. Parents and other adults are encouraged to participate.

Energy Education Activities for Elementary and High School Teachers. National Science Teacher Association, 1724 Connecticut Ave., NW, Washington, DC 20036. 1978, Free.

Energy - Environment Materials Guide. Mervine, Kathryn E. and Rebecca E. Cawley, National Science Teachers Association, Washington, DC, 1975, (ED 111 663). Handy source book containing annotated bibliographies for teachers, students. Non-print material.

Energy - Environment Mini-Unit Guide. Smith, Stephen M., ed., 1975. National Science Teachers Association, Washington, DC, (ED 111 664). Materials designed to stimulate decision making in young children and to make teaching more interdisciplinary. It is filled with many activities and guidelines.

Energy and Man's Environment. Jones, John, D.Ed., Editor, 1976. Energy and Man's Environment, Inc., 0224 S.W. Hamilton, Suite 301, Portland, OR 97201. Interdisciplinary teacher's guides to energy and environmental activities. Involves 8 books - Activity Guide, Uses of Energy, Sources of Energy, Impacts of Energy, Limits of Energy, Conversion of Energy, Future Sources of Energy, Glossary.

Energy and Man's Environment - Activity Guide. Ris, Thomas F. Energy and Man's Environment, 2121 Fifth Avenue, Seattle, WA 98121, (ED 106 070). Provides educational strategies and materials needed for introducing energy to all grade levels on an interdisciplinary basis. Each chapter has four themes: (1) Scientific, (2) Ethical, (3) Aesthetic, (4) Utilitarian.

Energy for Today and Tomorrow. San Diego City/County Schools Energy Education Committee Department of Education, San Diego County, 6401 Linda Vista Road, San Diego, CA 92111, 1975. Activities for students in grades kindergarten through six. These help to create an awareness of the need of dealing with energy problems.

Energy is Basic is a free information pack from the Energy Action Office, Westinghouse Nuclear Fuel Division, P.O. Drawer R, Columbia, SC 29250.

The Energy Show. The New Western Energy Show, 226 Power Block, Helena, MT 59601. It is a script for a puppet or acting show. $3.50.

The Energy We Use. National Science Teachers Association, (grade one), 1976, free. Available from DOE Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830.

Environmental Education: Strategies for Wise Use of Energy. Division of Science Education, North Carolina Department of Public Instruction, Raleigh, NC 27611, c. 1974. Designed for use at all grade levels, therefore, activities are grouped K-3, 4-6, 7-12. An appendix contains charts, glossary, bibliography, checklists.

Get Your Hands on Energy. The New Western Energy Show, 226 Power Block, Helena, MT 59601. A collection of simple, practical, "hands on" projects deals with energy concepts. $3.50.

Living Within Our Means: Energy and Scarcity. Environmental Educational Instructional Activities K-6, The University of the State of New York, The State Education Department, Albany, NY 12234. Instructional manual which illustrates ways in which environmental concerns may be integrated into the curriculum. Excellent activities arranged according to disciplines.

Mickey Mouse and Goofy Explore Energy. Walt Disney Productions, 1976. Public Affairs Department, EXXON, U.S.A., P.O. Box 2180, Houston, TX 77001. Very comprehensive, yet delightfully presented energy comic book. Copies are available from the above address. Covers previous sources of energy and possible future sources.

Nineteen Fact Sheets On Alternative Energy Sources. (1977) Sheets include wind; bioconversion; solar, ocean, geothermal, and nuclear power; coal-derived fuels; conservation; energy storage; environmental impacts; a glossary and a bibliography are also results of NSTA/DOE cooperation. The sheets are available from the Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. The materials were prepared by the National Science Teachers' Association.

North Carolina DPI, The Energy Conserver, available on request from the Division of Science Education, Room 284 Education Building, Raleigh, NC 27611, is a monthly newsletter full of tips on energy and schools, conservation projects, and classroom activities.

Student Learning Activity Module "The Energy Crisis". Hughes, Judi and Lee County Environmental Education Program, Title III ESEA, 2266 Second Street, Fort Myers, FL. Contains lesson plans, resource

materials, and a Student Teaching Module on energy. Developed to help create an awareness of the causes, and some solutions for the energy crisis the world is facing.

A Teacher's Guide For Energy Conservation. Contact: Jonathan Wert, Environmental Center, University of Tennessee, South Stadium Hall, Knoxville, TN 37916.

A Teacher's Handbook on Energy. Interstate Energy Leadership Project, Colorado Department of Education, 201 E. Colfax Ave., Denver, CO 80203.

Ways to Environmental Education; Volume III, Allen, Rodney F., Ed. and Others. Florida State University, Tallahassee College of Education, Tallahassee Junior Museum, FL, 1975, 150 pp. Ten environmental booklets in one volume. One booklet covers energy learning activities for camp and home.

Wide World of Energy Kit. Walt Disney Productions, 1976, Walt Disney Educational Media Company, 500 South Buena Vista Street, Burbank, CA 91521. Kit contains cassette and color filmstrip titled, "The Search for Power and Energy;" 18 full-color study prints; Energy Game; 30 copies of the energy comic book, "Mickey Mouse and Goofy Explore Energy;" 10 energy activity cards; teacher's guide with information and additional activities.

PERIODICALS

ALTERNATIVE SOURCES OF ENERGY features articles on many aspects of alternative technologies and is a clearinghouse for practical ideas on energy sources. Bi-monthly, $10/yr. from Alternative Sources of Energy, Inc., Route 2, Box 90A, Milaca, MN 56353.

CURRENTS is a survey of solar legislation, research, workshops, and alternative energy issues in Iowa. Published by Citizens United for Responsible Energy, 3500 Kingman Blvd., Des Moines, IA 50311 at $5/year.

EARTH JOURNAL, published quarterly, regularly features energy-related subjects. Costs $3/yr. from Minnesota Geographic Society, P.O. Box 6181, Minnehaha Sta., Minneapolis, MN 55406.

ENERGY AND EDUCATION, a bi-monthly newsletter is available free from NSTA, 1724 Connecticut Ave. NW, Washington, DC 20036. It features energy facts and news of educational programs across the country.

FREE ENVIRONMENT NEWSBRIEFS. Published eight times per year by Free Environment, Inc., Activities Center, Iowa Memorial Union, Iowa City, IA 52242 - $2. Deals with all types of environmental issues.

IOWA ENERGY BULLETIN. Published monthly by Iowa Energy Policy Council, 215 East 7th Street, Des Moines, IA 50319 - no charge. A survey of Iowa energy and conservation issues.

IOWA SCIENCE TEACHERS' JOURNAL, a quarterly, is available free to science teachers requesting it on the school letterhead, c/o Managing Editor,

ISTJ, Iowa Academy of Science, University of Northern Iowa, Cedar Falls, IA 50613. Volume 16, No. 1 (April 1979) focused on energy, with Iowa-specific information.

MOTHER EARTH NEWS is romantically "back to the land." It has interesting articles on unusual homes, low-energy life styles, recycling and bartering, "do-it-yourself" everything.

PEOPLE AND ENERGY is published monthly by Citizens' Energy Project, 1413 K Street NW, 8th Floor, Washington, DC 20005, $10. News of citizen action on energy and appropriate technology.

SCIENCE NEWS has weekly articles on energy research and technology.

MULTI-MEDIA MATERIALS

16 mm films, filmstrips, video cassettes and posters: The following items are a small, selected sample of the materials available on ENERGY.

For a broader listing of resources available to you at low or no-cost, contact your AEA, the media center of the nearest university, and the organizations listed in this publication. Also recommended is an excellent film bibliography, bound for library use and arranged by topics (What is Energy? Energy Issues and Options, Energy and the Environment, Energy Conservation, Sources of Energy). It is available at cost, $3, from New York State Alliance to Save Energy, 36 W. 44th Street, Room 709, New York, NY 10036. Ask for Energy on Film.

Filmstrips referred to in the ECAP's can be borrowed from your local AEA. In 1978, the AEA's received five sets of filmstrips. Some may have been sold to individual districts. Contact the DPI Energy Consultant if you are unable to locate a filmstrip through the AEA media center.

THE AMERICAN DREAM IS RUNNING OUT OF FUEL. 18 minutes, color, $230 or $19-rent (grades 5-8). Films, Inc., 1144 Wilmette Avenue, Wilmette, IL 60091.

American Gas Association, Dept. I-14, 1515 Wilson Blvd., Arlington, VA 22209, furnishes free 35 mm filmstrips. NATURAL GAS--SCIENCE BEHIND YOUR BURNER shows how gas gets from well to burner and comes with wall charts and worksheets. Other titles include, FUEL CELLS, HOW THE JET ENGINE WORKS, LOOK TO THE FUTURE, MORE TO COME (estimates of energy resources underground), SCIENTISTS WORK TOGETHER (case study of a fuel cell research project). Free films for teachers are available from the same source. ENERGY traces sources from the first fires to atomic power, outlines problems and proposes some solutions.

Association Films, Inc., 866 Third Avenue, New York, NY 10022 lends 16 mm movies free of charge. Examples of titles are MIRRORS OF TIME about a research ship exploring the ocean floor in search of gas and oil deposits; THE ENERGY BRIDGE about coal's potential to bridge the fuel resource gap; KING ZOB AND THE ENERGY CRUNCH about space heating and cooling conservation possibilities; UNSEEN JOURNEY about transporting crude petroleum.

BATE'S CAR: SWEET AS A NUT. 16 minutes, 16 mm, color, $230 or $30-rent, 1975 (grades 5-12). Arthur Mokin Productions, 17 W. 60th Street, New York, NY 10023. Presents the inventor's energy-saving inventions, particularly his methane-driven automobile. Highly recommended by AAAS.

COALMINING: THE STORY OF BURIED SUNLIGHT. Filmstrip #1, Part A, elementary, grade 5. Available through the local AEA.

Citizens' Energy Project, COMMUNITY SELF-RELIANCE POSTER, 1979, $4, from Citizens' Energy Project, 1413 K Street, 8th Floor, Washington, DC 20005. This colorful graphic displays a self-reliant community basking under the sun. Rehabilitated homes, bike paths, urban gardens, greenhouses, and a community health clinic are featured projects. Flip side lists resource people and other information.

CONSERVE YOUR ENERGY, a family energy diet kit (includes booklet, score card, poster) is available for $2 from Associated Press, 50 Rockefeller Plaza, New York, NY 10020.

C.U.R.E. (Citizens United for Responsible Energy) produced SOLAR ENERGY IN IOWA, a 22-minute slide show in 1977 which covers the basic principles of solar as well as projects in and near Iowa. A cassette and script is included. Rental for contribution from C.U.R.E., 3500 Kingman Blvd., Des Moines, IA 50312. 515/277-0253.

DOE Technical Information Center Film Library, P.O. Box 62, Oak Ridge, TN 37830, provides teachers with an annotated brochure on free energy films for classroom use. Write for your copy. Some titles that Iowa teachers have used and liked are LOOK TO THE SUN; SUN POWER FOR FARMS; THE ULTIMATE ENERGY and TO BOTTLE THE SUN (on fusion's potential); PUTTING THE SUN TO WORK (showing an innovative home); ENERGY, THE AMERICAN EXPERIENCE (which illustrates the historical relationship between economic growth, industry, and energy sources); CHALLENGE OF THE FUTURE; ON THE MOVE (about packing and shipping radioactive materials); POWER FROM THE EARTH (concerning geothermal energy); UP THE POWER CURVE, on conservation, covers a wide range of energy-saving ideas and estimates and savings from each; WORLD BEHIND YOUR LIGHT SWITCH tells in a non-technical way the story of production, transmission, and use of electricity.

ECOLOGY ACTIVITY CARDS are available from: BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90404. Some of the activities are related specifically to energy. Others in the box guide the children towards conservation and the idea of using our resources wisely.

ECOLOGY: UNDERSTANDING THE CRISIS is available from: Series No. 6454, c. 1972. Encyclopedia Britannica Educational Corporation, 425 North Michigan Avenue, Chicago, IL 60611. Filmstrip, records, guides generally cover what has caused the crisis, how man relates to his environment, plus a look into the future.

ENERGY: A FIRST FILM. 8 minutes, sound, color (grades K-3), BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90404.

ENERGY: ABILITY TO DO WORK. 9 minutes, color, sound (grades 5-8), AIMS Instructional Media Service, P.O. Box 1010, Hollywood, CA 90028.

ENERGY ALTERNATIVE OR FUTURE SOURCES OF ENERGY. Filmstrip #2, elementary grade 6. Available through the local AEA.

ENERGY AND ITS FORMS. U 25547, CORF-1961, 11 min. b/w, $5.60. Explains the basic concept of energy and shows examples of its principal forms, including nuclear energy. Introduces the idea of changing energy from one form to another to do work, and outlines the way in which plants convert the energy of the sun to chemical energy to provide a basic source of food and fuel. See "Iowa Films" listing for ordering information.

ENERGY AND WORK. US 25686, EBEC-1962, 11 min., color, $6.80. Explains through simple experiments that energy is neither created nor destroyed, but simply changed from one form to another. Illustrates a variety of these transformations and explains them in simple terms. See "Iowa Films" listing for ordering information.

THE ENERGY CHALLENGE - Kit, c. 1975. Pollution Control Education Center, Township of Union Public Schools, Union, NJ. Grade level undesignated, however, could be used in grade 6 with some modification and for the junior high. Contains student booklets, teacher's guide, two filmstrips with cassette, duplicating masters, activity cards, and overhead transparencies.

ENERGY CRISIS. U 30217, JOU-1972, 12 min., color, $8.30. Reviews our sources of energy and the length of time they may remain available. A hydro-electric plant, a conventional steamdrive electrical power plant and a nuclear power plant display how each generates power and its limitations. Concludes with possible solutions such as the "Fast Breeder Reactor" and "Fusion Reactor" which may someday provide unlimited power. See "Iowa Films" listing for ordering information.

ENERGY CRISIS GAME. 1973 (Upper elementary and junior high), Intemation, Inc., New York, NY 10001. For 2-6 players.

ENERGY DOES WORK. U 25548, CORF-1961, 11 min., b/w, $5.60. Billy, surprised to learn that when he is playing, he is doing work, is shown, by means of examples intended to appeal to the young child, that work is done whenever something is moved, that energy can be stored, and that food supplies energy to our bodies. See "Iowa Films" listing for ordering information.

ENERGY GAME. Northern Natural Gas produced a twenty minute slide-tape show followed by a quiz, designed for grades 4-6. The stress is upon energy conservation with a short review of where energy comes from. The kit is available through Northern Natural Gas, 503 Shops Bldg., Des Moines, IA 50309. 515/288-7463. No charge.

ENERGY HISTORY OF THE UNITED STATES 1776-1976 is a large, colorful wall poster for classroom use. Cost: $2.05 from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, Stock No. 052-010-00459-0.

ENERGY IN IOWA. Filmstrip #1, Part B, elementary grade 5. Available through the local AEA.

ENERGY: PAST AND PRESENT, and ENERGY: FUTURE SUPPLY AND COSTS are slide-tape sets available free from Iowa State Extension Service. Call the county extension office to borrow copies.

ENERGY WITH A CAPITAL C - FOR CONSERVATION. Energy Policy Council, 707 East Locust, Des Moines, IA 50319. Slide presentation comes complete with slides, audience pamphlets, and a recorded cassette of the slide narrative.

FIRST FILM ON THE WIND. 9 minutes, 16mm, color, sound, c. 1966, (Elementary), BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90404. Shows how, though one cannot see the wind, he can see what the wind does, such as making waves on the water, swaying trees, and lifting kites. Shows how rain clouds come and go with the wind.

Iowa Films. Films listed as "Iowa Films" can be ordered by phone, by mail, or in person. (Collect calls accepted from Iowa.) Ask for film scheduling. The two locations of film centers are:

University of Iowa	Iowa State University
Media Library	Media Resources Center
C-5 East Hall	121 Pearson Hall
Iowa City, IA 52242	Ames, IA 50011
319/353-5885	515/294-1540
Hours: 8:00-5:00	Hours 7:30-12:00
	1:00-5:00

Price list is the charge for three day rental. You are responsible for return postage. A written purchase order is required before shipment from the media resource person or business office of your school.

Iowa Energy Extension Service has several audio-visual resources available on energy conservation for no charge except return postage. Order from: Iowa Energy Extension Service, Iowa State University, 110 Marston Hall, Ames, IA 50011.

Films:

* THE GREAT ADVENTURE

A 30-minute color sound 16 mm production showing the potential for solar energy, emphasizing a variety of applications including wind and the making of fuels from biomass products. Eddie Albert narrates. 1979. For general use. Produced by Department of Energy.

* A CITY FARMSTEAD

  15 min., 16 mm color. Shows how one urban house uses solar, waste recycling and food production.

Slide Shows:

* PASSIVE SOLAR ENERGY

  Six separate slide shows of 20 slides each on the following topics: general, direct gain, conservation aspects, thermal storage walls, attached greenhouses, water heating and roof ponds. Pictures and projects mostly from New Mexico. Developed by Dr. J. D. Balcomb. Script included.

* THE SOLAR QUEST

  87 slides, 11 minutes, color. Documents how solar is being tapped for practical use in homes. Includes underground. Produced by The Polished Apple. Also available in filmstrip. Cassette tape accompanies. For general use.

* ENERGY FOR RURAL IOWA

  20 minutes. Discusses research projects at Iowa State Univesity. #S851. Can be ordered through Media Resources. Includes wind, research house, alcohol, methane. Produced in 1979.

Living History Farms. SEEDS OF SURVIVAL, a 28-minute film portrays American farming of pioneers, and farmers in the 1900's and today. Energy reliance and sources are evident. The film is available for $3 from: The Grinnell Mutual Reinsurance Company, Public Relations Department, Grinnell, Iowa 50112; or Living History Farms, R.R. 1, 2600 NW 111th St., Des Moines, IA 50322.

MAN'S SEARCH FOR ENERGY. Filmstrip, 36 frames, $6.75, (grades 5-8), McGraw-Hill Films, 1220 Avenue of the Americas, New York, NY 10020.

Modern Talking Picture Service, 2323 Hyde Park Rd. New Hyde Park, NY 11042, offers a variety of free films produced by major industries as public relations/education efforts. Most of them are very professionally done; many are cinematic award winners. Write to the above address for their free lists. (Films are shipped from the Modern Library in Cedar Rapids.) A few of their other energy-centered movies available to junior and senior high schools are: WITHIN THIS EARTH, A MATTER OF ENERGY, MINING AND THE ENVIRONMENT, ENERGY VS. ECOLOGY, THE GREAT DEBATE, NUCLEAR ENERGY FOR TODAY AND TOMORROW, OFFSHORE, REFINERY, ENERGY IN PERSPECTIVE.

THE PETRIFIED RIVER. Film available from Iowa Electric Light Company.

RHR Filmedia, Inc., 1212 Avenue of the Americas, New York, NY 10036 will lend (free) the 16 mm color film, A QUESTION OF VALUES. This is the story of a small town's intense debate over potential benefits and dangers of a new oil refinery. Also, free on loan from the same source, THE HIDDEN ENERGY CRISIS explains that energy shortages may reduce supplies of petrochemicals commonly used in clothing, shelter, and food, and DOUBLE UP AMERICA explains benefits of carpooling.

Kienow, Robert. DARKNESS FOR OUR CITIES is an audiotaped plea for wasteful Americans to change their ways. It would be a useful introduction to an energy or conservation unit. Students will hear many possibilities for further research. Available for $14.95 from Center for Cassette Studies, Inc., 8110 Webb Avenue, North Hollywood, CA 91605.

Shell Oil Company Film Library, 1433 Sablier Circle West Drive, Indianapolis, IN 46239 will send you a list of films available on free loan. Some energy-related offerings are: THE FOSSIL STORY which emphasizes significance of fossils in the search for oil deposits; THIS LAND which explores the natural resources of North America, including oil and coal, and how they were formed; OIL, OIL WELL, and REFINERY PROCESSES which depict the source and processing of American's favorite fuel; and FOOD OR FAMINE which illustrates methods of improving agriculture around the world.

Union Carbide Corporation, Public Affairs, 1730 Pennsylvania Avenue NW, Washington, DC 20006 will provide a free wall chart listing nearly 500 NON-FUEL USES FOR OIL.

U.S. Department of Commerce, Office of Energy Programs, Room 3011, Washington, DC 20230 will lend (free) the 16 mm color film on ENERGY: CRITICAL CHOICES AHEAD, a discussion of energy supply and demand through the year 2000.

ORGANIZATIONS AND RESOURCES

If you have the energy to write a few letters on school stationery, the following organizations will fill your mailbox with free or low-cost information on energy topics.

American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209 has an energy newsletter, films, ditto masters, and a variety of free literature free to teachers who request them on school stationery.

American Petroleum Institute, Information Service Department, 2101 L Street NW, Washington, DC 20006 provides an abundance of colorful materials for classroom use, free on request, including movie loans.

American Public Gas Association, Watergate Office Bldg., 2600 Virginia Ave. NW, Washington, DC 20037 provides free educational materials on request.

American Wind Energy Association, 1621 Connecticut Avenue NW, Washington, DC 20009 will send a brochure of general information about windmills, an invitation to join the club, and a list of publications available on the subject of wind machines.

Area Education Agency (AEA) has films, filmstrips, book catalogs and other resources for energy education. Contact the nearest one.

Association of Home Appliance Manufacturers, 200 N. Wacker Drive, Chicago, IL 60606 provides free "Energy Data" on typical operational costs of home appliances.

Atomic Industrial Forum, Public Relations Department, 7101 Wisconsin Avenue, Bethesda, MD 20014 will send information on nuclear power plants, including black-and-white graphics (for easy reproduction) diagramming various types of reactors.

Chamber of Commerce may be able to help locate solar buildings, alternative energy-related businesses, knowledgeable members of the community who may cooperate on an energy project for the class.

Citizens' Energy Project, 1110 - 6th St., NW, #300, 8th floor, Washington, DC 20001 researches and publishes comprehensive, low-cost reports on dozens of energy resources. Write for current list of titles.

Citizens United for Responsible Energy (CURE) 3500 Kingman Blvd., Des Moines, IA 50311, Tel. 515/277-0253, maintains a roster of speakers on energy topics and publishes a newsletter that often features "solar successes."

Cooperative Extension Service, 110 Curtis Hall, Iowa State University, Ames, IA 50011 has many bulletins and pamphlets on energy conservation available for the asking. Write or call 515/294-4576.

Edison Electric Institute, Public Relations Department, 90 Park Avenue, New York, NY 10016, provides information on all forms of electrical generation and a series of useful handbooks of energy-related experiments for the classroom.

Energy and Education Action Center, Room 514, Reporters Building, 300-7th St. SW, Washington, DC 20202, serves as an information center and data distribution network centered on energy-education materials and conservation measures.

Energy Extension Service, 110 Marston Hall, Iowa State University, Ames, IA 50011, has information and programs for schools and communities. Write or call 515/294-4266 for an up-to-date list of services.

Energy Research and Information Foundation, 3500 Kingman Blvd., Des Moines, IA 50311. ERIF is a non-profit corporation to promote and conduct research and educational projects as well as to provide information. Programs include Energy Sources, Kill-A-Watt, and a Traveling Solar Display. Phone: 515/277-0968.

Environmental Action Foundation, The Dupont Circle Bldg., Suite 724, Washington, DC 20036 will send a resource guide on electric utility issues.

Environmentalists for Full Employment, 1101 Vermont Ave N.W. #305, Washington, DC 20005 has published Jobs and Energy ($2 for individuals) and Jobs and Energy Update (50 cents each), exploring the impact of energy use transitions and alternative energy sources on employment. They advocate conservation and diverse solar systems as the best answers to the related problems of unemployment and the capital drain made by corporate energy industries.

Ethyl Corporation produces an annual Ethyl Digest on an energy topic. Get a free copy by writing to Ethyl, Corporate Public Relations, 330 South Fourth St., Richmond, VA 23217.

Ideas and Information Center, Iowa-Illinois Gas and Electric Company, 1403 Kimberly Road, Bettendorf, IA 52722. Phone 319/326-7054. Educational materials and answers to specific questions on local utility rates, consumption patterns, and insulation guidelines.

Institute for Local Self-Reliance, 1717 - 18th St. NW, Washington, DC 20009. This non-profit educational and research group explores possibilities of urban communities becoming productive, self-reliant systems. Write for their list of publications on topics like "A Neighborhood Energy/Food/Waste System," "Dawning of Solar Cells," "Neighborhood Power," and various food production concerns.

International Solar Energy Society, American Section, 12441 Parklawn Drive, Rockville, MD 20852 maintains a bibliography of solar and other renewable energy sources.

Iowa Academy of Science, University of Northern Iowa, Cedar Falls, IA 50613 publishes the quarterly Iowa Science Teachers Journal. The April 1979 issue featured several energy-education articles including "Wind Energy in Iowa." This one issue is available

free to science teachers using school stationery for their request to the Editor, ISTJ. Subscription rate is $4/year.

Iowa Center for Local Self-Reliance, 3500 Kingman Blvd., Des Moines, IA 50311. The center is trying to research, demonstrate and educate the public about technologies and social structures which lead to self-reliance such as solar energy, energy conservation, organic gardening, recycling, and water conservation. Demonstrations, pamphlets, programs and consultations are offered. Phone: 515/277-0968.

Iowa Energy Policy Council, Lucas Bldg., Capitol Complex, Des Moines, IA 50319 has up-to-date information on energy use in Iowa and booklets on a variety of energy topics. Hotline: 515/281-4306.

Iowa Solar Office, Iowa Energy Policy Council, Capitol Complex, Des Moines, IA 50319 has solar energy information and materials including publications, films, a speakers bureau, consumer materials and lists of Iowa solar businesses and architects. Phone: 800/532-1114.

Iowa Solar Energy Association, 1433 Wildwood Drive, Cedar Rapids, IA 52402, 319/365-6103 may be able to provide you with resource persons who are knowledgeable about solar technology.

League of American Wheelman, 19 S. Bothwell, Palatine, IL 60067 provides information on ways and means of improving conditions for bicycling.

League of Women Voters of the United States, 1730 M Street NW, Washington, DC 20036 has a catalog of their own free or low-cost energy publications. Revised annually, this catalog is available from "Energy Department Publications" at the above address.

National Coal Association, 1130 Seventeenth Street NW, Washington, DC 20036, has articles, booklets, films, and other aids available on request that discuss the past, present, and future of coal.

National LP-Gas Association, 1800 North Kent St., Suite 1004, Arlington, VA 22209, provides free information about their products.

National Petroleum Council, Director of Information, 1625 K Street NW, Suite 601, Washington, DC 20006, provides free literature on various aspects of getting and using petroleum.

National Science Teachers Association, 1724 Connecticut Ave., NW, Washington, DC 20036 will send any teacher their bimonthly newsletter Energy and Education (free) plus a list of other energy publications.

National Solar Heating and Cooling Information Center, P.O. Box 1607, Rockville, MD 20850 publishes many handsome no-cost brochures and books, like "Passive Design Ideas for the Energy Conscious Consumer." You can call this group toll-free at (800) 523-2929.

National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 sells reprints of many otherwise-difficult-to-locate publications on a wide variety of energy topics. Write for a free list of publications.

National Wildlife Federation, 1412 - 16th St. NW, Washington, DC 20036 has conservation education publications and selected resource materials for developing energy education programs.

Public Interest Research Group, P.O. Box 19312, Washington, DC 20036 can provide information on Energy Alternatives.

Shell Educational Services, Shell Oil Company, P.O. Box 2463, Room 1541, One Shell Plaza, Houston, TX 77001 can provide energy education materials.

Sierra Club, Information Services, 1050 Mills Tower, San Francisco, CA 94104 will provide an Energy Packet for $1. This collection of articles includes "Solar Energy Now," and "Geothermal Energy" among several others.

U.S. Government Printing Office, Washington, DC 20402, offers many energy-related publications at prices from $1 to $10. Write to the above address and ask for Subject Bibliography Index and Price List 36 which contain information for selecting materials pertinent to energy-environmental issues.

Utility and/or Power Companies often have pamphlets and filmstrips, and sometimes posters, games, and lesson plans available to teachers.

Volunteers in Technical Assistance (VITA), 3706 Rhode Island Ave., Mt. Rainier, MD 20822 publishes technical bulletins on do-it-yourself technology including solar, hydro, and wind-powered projects. Bulletins are well illustrated, clearly written, and range in price from $1 to $6. Write for a free list of titles.

COAL MINING

Filmstrip #1 - Part A

#1 Coal is the most abundant of the fossil fuels. New attention has been turned to coal even though it presents special problems. When coal contains quantities of sulfur, its recovery and burning are potentially hazardous to the environment. Upon burning, harmful sulfuric gases are released into the air. Retrieving coal from the ground without destroying the environment is another problem. In strip mining, the shale which is removed contains sulfur which turns to a harmful acid when exposed to air and moisture.

#2 One method of getting coal from the ground is an underground mine. The New Gladstone mine in western Appanoose County was one of the last to use the advancing longwall method. Rock beneath the seam of coal is undercut and removed. The weight of the roof breaks the coal down.

#3 Underground mining by machine, Jude Coal Compant.

#4 A mine near Lovilia is the only underground mine operating in Iowa as of the summer of 1980. It uses the room and pillar method. Two main tunnels run through the coal seam and the miners work away from the tunnels carving out rooms as they remove the coal. Pillars of coal are left as supports and result in a loss of coal. The picture shows a portion of Lovilia Mine #2 in Monroe County, Iowa.

#5 Surface, or strip mining, is another often more economical method of coal mining. Five strip mines presently operate in Iowa. In strip mining, bulldozers chew away at the earth, leaving scars and gashes where hills and curves once were a part of the landscape. Some land in Iowa shows these scars. States are beginning to regulate strip mining and a federal law has recently been enacted.

#6 Beginning with a $3 million, 3-year appropriation from the Iowa legislature in 1974 followed by three increments of supplementary funding, the Iowa Coal Project has worked to develop economically feasible methods of digging mines and reclaiming the land as they mine.

#7 The area was divided into sections and as each section was worked, the topsoil, glacial till, and shale were stripped off in layers and placed in ivdividual piles. The coal was then removed and the layers put back. Bench terraces were formed and these are available for farming.

#8 Mistakes of the past indicate that today's techniques must consider the environment. Here we see how the land was left in Iowa after some of the old mining methods were used. It is extremely difficult to find plants which will grow on these spoils because of the high acidity of the soil.

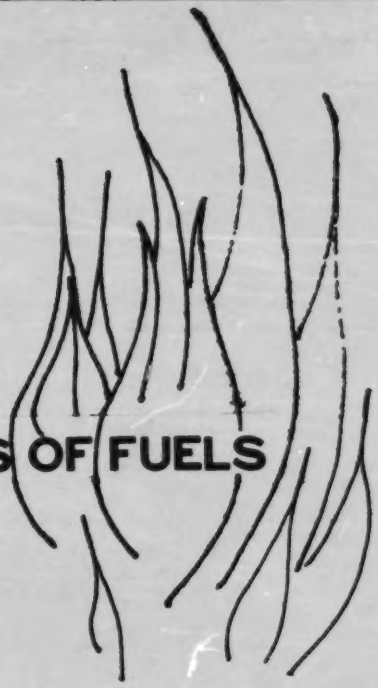
#9 Due to experiments such as those conducted by Iowa State University, by Germany, and elsewhere, we have seen that land can be improved after mining and become useful again for agriculture.

#10 Iowa's coal has a high sulfur content and contains other non-combustible materials. Attempts are being made to reduce the amount of sulfur and non-combustible materials found in coal before burning to help Iowa coal compete in the coal market. The Iowa Coal Project Coal Refining Plant was constructed on the Iowa State University campus in Ames in May 1976. Coal coming into the plant is crushed and sorted on a size basis. Larger pieces of coal are taken by conveyor to a heavy media separator where coal is added to a slurry (a watery mixture composed of powdered magnetite). The coal floats on the slurry and the impurities sink. The coal is then rinsed, dried, and taken by conveyor to the clean coal stockpile while the refuse is dried and stockpiled for burial in the mine. Since the plant began full operation, 70 to 90 tons of coal per hour have been cleaned.

#11 From 1900 to 1920 Iowa was consistently listed among the nation's top 11 coal producers. At that time there were several hundred mines in Iowa producing between four and nine million tons of coal annually. Many of these were deep mines. In 1977, there were nine strip mines and two deep mines producing 600,000 tons of coal. The Iowa Geological Survey has been working since 1973 to obtain one core sample from each Iowa county to help define the quantity and quality of Iowa's coal reserves. It may be that once again the coal industry will boom in Iowa.

BURNING

QUALITIES OF FUELS



Type of Fuel	Burn Easily?	Smoke?	Odors?	Hot Flame?
Candle				
Silver of Coal				
Kerosene				
Alcohol				
Wooden Splint				
Natural Gas				

The Petroleum and Natural Gas Story

from Energy for Today and Tomorrow, San Diego, California

What you need: pencil

What to do:

Read and study this story carefully. It will help you with the puzzle in the next activity. Some words are left out. Select the correct words and write them in the blanks.

found	search	made	easier
around	moves	special	life
		rock	area

Petroleum (crude oil) and natural gas are found deep in the earth in many places (1) _____ the world. These two energy sources are called fossil fuels, because they are the remains of animal (2) _____ which existed thousands of years ago.

The petroleum geologist uses many tools in his (her) (3) _____ for oil and gas. He (she) uses a seismograph which helps locate earthquakes and instruments for identifying the strata or layers of sedimentary rock. Most oil and gas is (4) _____ in sand and shale.

Shallow wells are usually drilled with a cable tool rig. This consists of a heavy bit, which is raised and released to fall into the hole. It is like punching a hole into the ground with your pencil. Deeper holes are drilled with a rotary rig which actually drills a hole into the (5) _____. Special mud is used to cool the drill bits. A derrick (tower-like structure) is put up (erected) during the drilling to help handle the various drilling tools and pipe. Pipe (casing) is used to line the hole, preventing it from caving in.

When oil or gas is found in large enough quantities, the producing rock strata is usually fractured (broken up) with explosions or acid to make the flow (6) _____. If no oil or gas is found in commercially profitable quantities, it is called a dry hole. A large flowing well is called a gusher. If several wells are successful in the immediate (7) _____, it is called a pool. A successful well is called a producer.

Oil is transported by pipeline, truck, or tanker (ship) to the refinery. At the refinery, the crude oil is treated by many chemical processes including cracking and distillation. It is (8) _____ into gasoline, diesel fuel, jet fuel, home heating oil, kerosine, grease for lubrication, paint and plastic ingredients, as well as many other products.

Gasoline is graded according to its octane rating. Many synthetic materials are made from gas and oil by-products. Butane and propane are made from petroleum. Most petroleum products must be handled, transported, and stored carefully because of the fire hazard involved.

Natural gas (9) _____ by pipeline from the gas fields. It is often stored under high pressure in underground cavities. Natural gas is used for cooking and heating in factories, and as a fuel for steam generators which produce electricity. Many of the ingredients in clothing, paint, camera film, etc. are made from the by-products of natural gas. Natural gas is also dangerous if not handled carefully. It is often given a (10) _____ odor so that a leak can be detected.

When you have finished, read this page carefully. Many of the words will appear as answers in the crossword puzzle in the next activity.

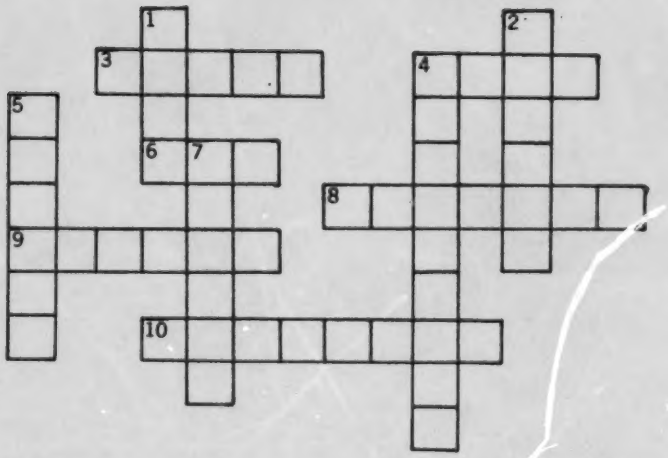
ENERGY Puzzle

What you need: pencil

What to do:

Use the information found in the last activity to fill in the blanks of this energy puzzle.

Oil Exploration and Production



ACROSS

3. Shallow wells are drilled with a _ ___ tool rig.
4. An area with several producing oil or gas wells.
6. A _____ hole has no commercially profitable production.
8. A tower structure over a well being drilled.
9. Layers of rock.
10. A producing gas or oil well.

DOWN

1. Small, loose grains of rock where gas or oil is sometimes located.
2. Remains of organic or plant life.
4. Crude oil in its broadest sense.
5. A type of fuel produced from crude oil.
7. A type of rig used for deep oil or gas drilling.

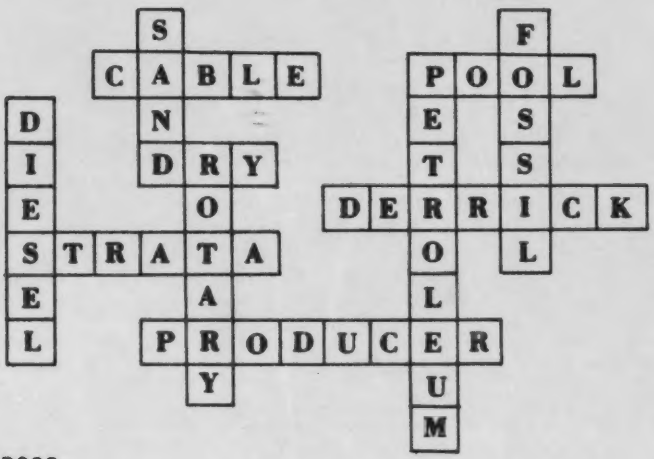
Teacher's Answer Key
for Master #1, 2
Packet "A"
Activity A, (1.4), pg. 6

#1

ANSWERS:

1. around
2. life
3. search
4. found
5. rock
6. easier
7. area
8. made
9. moves
10. special

#2



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Display items such as:

LIPSTICK	CANDLE	NYLON
NAILPOLISH	MOTHBALLS	RAYON
VASOLINE	PAINTS	FERTILIZER
	PLASTIC	STYROFOAM

in an interest center

Suggestions for student action cards

#1. SELECT ONE OF THE ITEMS IN THIS DISPLAY.

DO SOME RESEARCH

a. What raw materials were used to make this product?

b. Describe the manufacturing process.

c. Note kinds of energy used in production of this product.

#2. WRITE A LETTER TO 2 MANUFACTURERS OF THE SAME TYPE OF PRODUCT (I.E. TWO DIFFERENT BRANDS OF LIPSTICK)

a. Inquire

1. about the raw materials used

2. about the manufacturing process

b. Compare information received

1. are the same raw materials used?

2. how do the manufacturing processes differ?

c. Share this information with your class

1. oral presentation

2. bulletin board

3. booklet

#3. BE CREATIVE

RECYCLE STYROFOAM PACKAGING

a. List as many uses of this material as you can.

b. Challenge a friend to come up with a longer, more creative list.

c. Share one of your creative uses with your class.(make it!)

#4. HOW OFTEN DO YOU USE PLASTICS?

a. List everything in your classroom that is made of plastic.

b. List plastics you use in your home.

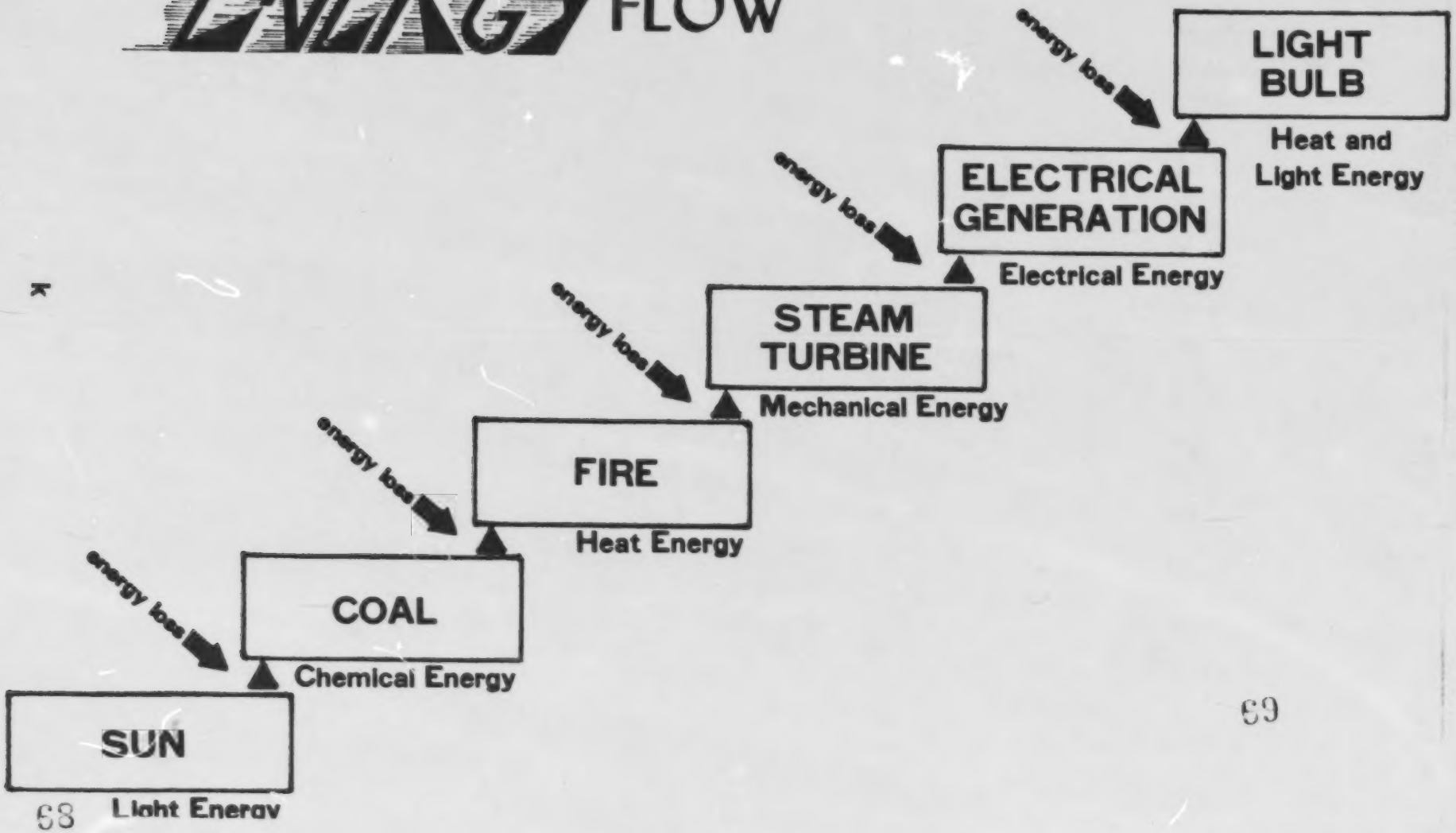
c. Evaluate your list. If plastic was no longer available, how would this effect your life? What other materials would you use?

Energy Activities
Grade 5
Packet "A"
Data Sheet #2
ctivity C, (1.5), pg. 7

RESOURCE DETECTIVES

Object	Natural Resource(s)
(example) Blackboard	Slate

ENERGY FLOW


LIGHT BULB
Heat and Light Energy
energy loss
ELECTRICAL GENERATION
Electrical Energy
energy loss
STEAM TURBINE
Mechanical Energy
energy loss
FIRE
Heat Energy
energy loss
COAL
Chemical Energy
energy loss
SUN
Light Energy

VALUES FOCUS RULES

1. THE RULE OF FOCUSING

   Each group member is the focus person for five minutes. The attention of the group is not to shift from the focus person until his time is up or he asks to stop. Questions may be asked of the focus person as long as focus is not shifted to someone else.

2. THE RULE OF ACCEPTANCE

   Be warm, supportive, and accepting of the focus person. If you do not agree with the focus person do not express disagreement during the discussion part.

3. THE RULE OF DRAWING OUT

   Try to understand the focus person's positions and feelings. Ask questions which will help you to understand the focus person's feelings. Make sure your questions do not shift the focus to yourself. Also, make sure you do not reveal negative feelings.

AGREE/DISAGREE ENERGY WORKSHEET

Name _____

Directions: Circle the response which most closely indicates the way you feel about each item.

SA = Strongly Agree
AS = Agree Somewhat
DS = Disagree Somewhat
SD = Strongly Disagree

Item	Response			
1. There is an energy shortage.	SA	AS	DS	SD
2. We should stop using all fossil fuels immediately.	SA	AS	DS	SD
3. We do not have to worry about using up our energy.	SA	AS	DS	SD
4. Plastics, styrofoam, nylon, lipstick, etc. should no longer be manufactured.	SA	AS	DS	SD
5. If we cut our energy uses we will have to go back to living the way people did in the 1900's.	SA	AS	DS	SD
6. Fuels are necessary for our energy use.	SA	AS	DS	SD
7. Laws should be passed to make people use less gasoline and less electricity.	SA	AS	DS	SD
8. Energy would be saved if all stores were closed on Sundays.	SA	AS	DS	SD
9. I would encourage my family to save energy.	SA	AS	DS	SD

ENERGERUS AND HIS KINGDOM

Setting: Energerus' Kingdom far off in space

Time: 1973

Our story begins in the sitting room of the kingdom where King Energerus is anxiously pacing the floor. Everyone in the kingdom seems quite upset.

King: Oh my, Oh my, Oh my, Oh my, Just look down there at those Earthlings. What a mess they are in. Don't they know that nothing can be done without energy?

Coalus: King Energerus, it's not their fault. They can't help that they have messed up their energy situation.

King: Ohhhhhhhhhhhhhhhhhhh, How sad it all is.

Oilus: What has happened is that the country's demands for energy has exceeded its ability to supply it.

Atomus: You know what I think is the problem down there is that their production and uses are putting a heavy strain on their energy reserves.

King: Oh, Atomus, that doesn't help at all. Just look down there at all that energy confusion.

Windus: Don't those Earthlings know that if there is no energy, the rivers would not run, the stars would not shine, there would be no sunlight and everything would be frozen and lifeless and still?

All: Oh, Windus, how terrible (all groan).

Coalus: We must help them!

Atomus: But how?

Oilus: We must help them with their energy crisis. You all know that whenever work is done, the force that is needed is supplied by some kind of energy.

Atomus: Yes, but how, how?

Oilus: We must help them with their energy crisis. You all know that whenever work is done, the force that is needed is supplied by some kind of energy.

Atomus: Yes, but how, how?

Coalus: Every day the average man, woman and child in the U. S. uses nearly four gallons of oil, 300 cubic inches of natural gas, 15 lbs. of coal and smaller amounts of other energy. Energy is the mysterious something that makes work possible.

Windus: Without energy, we all agree, it would be impossible for their life to go on.

King: We must help them for you all know that having enough energy available and using it properly is important to the progress and happiness of all mankind.

All: Yes, that's right, ...

Atomus: The most important happening will take place on earth as energy becomes available. Energy determines the standard of living of the Earthlings.

Coalus: We must help the Earthlings realize that energy control makes it possible for people to live better. Fuller use of energy helps people produce more food, get food and clothing and other necessary things with less work.

Windus: Do you think the Earthlings know about energy, know things like energy can be changed from one form to another or that energy is neither created nor destroyed, that energy can be stored, that energy can be carried from place to place?

King: Oh, I don't know what they know--all I know is they need help. They are having an energy crisis and their energy situation is very uncertain.

All: Let's help them, let's help them.

King: All right, all right, I have a plan. I have sent for (King claps hands) Mr. E. Conscience and his sidekick Jr. E. Conscience. Bring them forth. (Atomus and Oilus escort them in to the king and they bow before the king). You have a difficult task before you, my friends. The Kingdom of Energerus is depending upon you.

Cons. & Jr.: How can we serve you, our King?

King: I must leave now but the other gods will tell you your assignment. And may you have the energy to carry out your mission with success. (King exits) (all bow)

Coalus: Mankind the last century has been using up energy at a greater and greater rate.

Oilus: Some people think that all the oil will be gone by the year 2000.

o

Coalus: And most of the coal by the year 3000.

All: Moan and groan.

Cons. & Jr.: What can we do?

Windus: You must go to Earth and give the Earth people wisdom and insight on how to handle their problem.

Cons.: Fine, Fine. We will go and help the people of Earth. We will help them think about other energy sources.

Jr.: We can help them learn how to better use what they have already.

Cons.: One touch from us and the knowledge of the Energy Kingdom will be theirs.

Jr.: We will help the earth people help themselves.

Cons.: Don't worry, Gods of the Energy Kingdom, we will succeed--our mission will be a mission of triumph!

All: Good luck...Good bye...Yea for Mr. E. Conscience... Yea, Yea, Yea.

(All Exit)

Narrator: Mr. E. Conscience and Jr. E. Conscience have arrived on Earth to begin their mission.

Cons.: Now don't be nervous, Jr., we have a job to do and we will do it. The Gods of the Energy Kingdom are depending upon us.

Jr.: (Nervously) I know, Mr. Conscience--but it's such an enormous undertaking and if we don't succeed it would be just....

Cons.: Don't even think that way, Jr. We will succeed--there is no doubt. Hey look, that looks like a good place to start.

Narrator: Mr. E. Conscience and Jr. E. Conscience are looking in the window of a house on Earth in which a mother and daughter are in the kitchen talking.

Mother: Stephanie, you have left the TV on in the other room and no one is watching it.

Steph.: Aw, Mom, I'll be going in to watch some more later on. Hey, Mom, this faucet is still leaking. Did you call the plumber yet?

Mother: Not yet. I have been meaning to but I haven't gotten around to it. Stephanie, will you put this one potato in the oven to be baked for your brother for supper?

Steph.: Sure, Mom. Say, Mom, did you know the iron is still on?

Mother: Oh, I'll be ironing after dinner--just let it be. Dear me, someone has left the refrigerator open all this time. Stephanie, don't open those drapes and let the sun get into my eyes.

Steph.: Okay, Mother, I'll leave the drapes closed. Mother, isn't that cake mix mixed yet? That beater has been running for 1/2 hour.

Mother: Yes, I'm sure it's mixed but a little extra beating for good measure never hurts.

(Conscience and Jr. jump into room, dance around and give little nudges to both)

Steph.: (Enthusiastically) Mother, I'll turn off the TV till I need to use it again and I'll call the plumber for you right now.

Mother: Fine, Stephanie. And I'll put the rest of the dinner in now and get it all cooked while the oven is on. Daughter, go turn off that iron please until I'm ready for it. Let's remember to be careful about that refrigerator door.

Steph.: Mom, I'm going to open the drapes and let the sun, the warm sun shine in.

Mother: Fine idea and stop the beaters of the mixer too, please. The cake mix is done, I'm sure. You know, daughter, we must be more careful in our use of appliances and such. We need to do our share to help conserve energy.

Steph.: Yes, Mom--you're so right! (They hug and skip off stage.)

Cons.: Looks like we're off to a good start. But we have a long way to go.

Jr.: Looks as if a car is coming down the road. Maybe we can do some good there. (Car drives onto stage.) I'm going to give them the old wisdom pinch right away.

Driver Danny: I am just going to have to use my car more efficiently, Angie. I'm going to get this car a good tune up so I have good fuel economy. I'm going to have its air filter cleaned so it won't restrict the air flow and use extra fuel. I'm going to check the spark plugs so they don't misfire.

Angie: Driver Danny, I'm so glad to see you driving at 50 mph. You know they say you use 25 to 30% more gas to drive at 70 mph than 50 mph. Let's stop and increase the tire pressure a little--that saves gas too.

Danny: Good idea. (One jumps out and adjusts tires.) You know, Angie, tomorrow when I start the car in the morning I'm not going to let it run for such a long time to warm up and I'm not going to jack-rabbit out of the garage.

Cons.: If we really want to help the Earthlings we need to look at the source of some of their problems. We need to go to the oil fields and see what's going on there and give them our wisdom whack!

Jr.: Good idea, Boss. Let's head West.

Cons.: There are some oilmen over there.

(They sneak around the oilmen and give them a little hit and flee away.)

Oilman 1: We must make the people aware of the importance of oil.

Oilman 2: Yes, but what's more important we must inform the people on how to conserve the oil.

Oilman 3: I don't think the public realizes that it takes millions of years to make an oil field but only 20 to 30 years to use it up.

Oilman 5: Present and future demand for oil is massive. To meet the expected growth the industry would have to add 4 million barrels a day of producing capacity a year.

Oilman 4: I wonder if the people realize that oil is the number one prime energy source. I wonder if they realize that a ton of oil contains twice as much energy as a ton of coal and it can be handled with pumps and can be shipped in tankers across the ocean and pumped through pipelines to refineries and shipping ports.

Oilman 3: It is hard to realize that the United States has large but not unlimited supplies of oil. We must begin to get our oil from those hard-to-reach places.

Oilman 2: The North Slope of Alaska was a major find several years ago, but so far not a drop of Alaskan oil has been piped to the lower 48 states.

Oilman 1: Offshore wells on the continental shelves are a source of oil but they are expensive to drill.

Oilman 2: There are many problems--oil spills into the ocean, legal difficulties, high prices for oil, political changes which interrupt the flow of oil from other areas of the world.

All: Yes, yes, you're right--what will we do, etc.

Oilman 4: I've got it. You know the song the men of the oil fields sing--we must bring that song to the people.

Oilman 5: Here come some oilmen now singing their song. Listen! (Oilmen enter singing their song.)

Chorus: (Oil song)

Oilman 1: That song has the message that the people must hear. We will bring that song and its message to the people. (All exit singing song again.)

Cons. & Jr.: (Jumping up and down) We've done it again. We have helped the people of Earth help themselves.

Jr.: I'm still worried about their future. You heard those oilmen say that the oil isn't limitless.

Cons.: You're right to worry, Jr., but Earth's scientists may be the answer to their problems. We need to find some scientists so we can give them the old Energerus Kingdom Kick.

Jr.: You're right, Mr. E. Conscience--they will need all the help they can get. Look up ahead--there seems to be a laboratory.

(Some scientists are working at a table in a laboratory.) Conscience and Jr. give each a little kick.

Scientist 1: Don't worry men--we will come up with new energy sources--remember necessity is the mother of invention. I remember that after 1942 we learned how to make nuclear energy from one kind of uranium.

Scientist 2: There is another way of using nuclear energy; with hydrogen fusion. We can use a kind of hydrogen atom as fuel. There's lots of hydrogen atoms in the oceans.

Scientist 3: This would give us enough energy to last for 1 million years or more.

Scientist 2: How about making use of heat energy underground?

Scientist 4: Yes, the interior of the earth is hot, and if we could learn to make use of the heat we would have an energy supply that would last for ages.

Scientist 3: What about turning directly to the sun and collecting solar energy? Already batteries have been developed that change the radiant energy of the sun directly into electric energy.

Scientist 1: Many substances are potential sources of energy. Our prime energy sources, nuclear power, hydroelectric power, coal, natural gas and oil may only be the beginning.

Scientist 4: The world is beginning to climb to a new level of energy use. If we can learn to control energy there will be a standard of living so high that the poorest person alive can be sure of having enough to eat, of being properly taken care of when he is sick and of getting as much education as he can use.

Scientist 2: Having energy available and using it properly is important to the progress and happiness of all mankind.

Scientist 3: All right, men, study, investigate, experiment, invent, think, design, discover and plan. We scientists will control energy and make it possible for people to live better.

All: Yeah--hurray--wonderful...etc.

(Conscience and Jr. dance in very happily.)

Cons.: Jr., all is going well but there is one more stop we must make before we return to the Kingdom.

Jr.: Where is that, Mr. E. Conscience?

Cons.: We must visit the men who make the decisions, the leaders of the country--we must bring the touch of wisdom from the Kingdom of Energerus to the Governmental officials.

Jr.: Good idea. I hear there are many of these kind of Earthlings in Washington, D. C. Hey, that must be Washington, D. C. See the White House and the Capitol Building? There seem to be some government officials.

Cons.: Let's make sure we give each the Energerus touch of wisdom. After each is touched they will make a profound statement.

(They dance around touching each of the government officials.)

(Each steps forward with a sign around their neck indicating who they are.)

President: Mankind depends on natural resources. The well-being of individuals and the economic welfare and political strength of nations depends on resources.

V-President: The possibility of rationing depends on how well the people will cooperate with volunteer programs of energy conservation.

Congressman: Our energy crisis and the resulting shortage of petroleum products is posing a real threat to all of the small businesses which rely on these supplies for their finished products. Whatever programs develop for allocation or rationing of petroleum products--consideration to America's small businesses must be given.

Governor: I urge all (Iowans) to reduce their energy consumption on a voluntary basis. Unless voluntary action is taken the federal government will step in and further encroach on private lives.

Senator: Congress will have to adopt some resolutions and practical programs to meet the energy crisis.

Deputy Secretary of Treasury: The FEA, Federal Energy Administration, provides an umbrella energy force. This agency will manage the fuel crisis.

Secretary of State: Our goal must be a successful Mid-East peace and a conclusion of the war and the Arab fuel embargo lifted.

Cons.: It looks as if Earth is in good hands. These leaders of their nation will give them the guidance and direction they will need to overcome their Energy Crisis. I think it is time for us to return to the Energerus Kingdom. Our mission has been accomplished.

Conscience and Jr. leave stage - circle around room - (Meanwhile kingdom is set up on stage and when they come back on stage all the Gods stand up and give ovation.)

Narrator: Our story now takes us back to the Kingdom of the Gods.

King: Welcome, welcome. You have done a fine job. We are proud of you. People of Earth will make it because of your help.

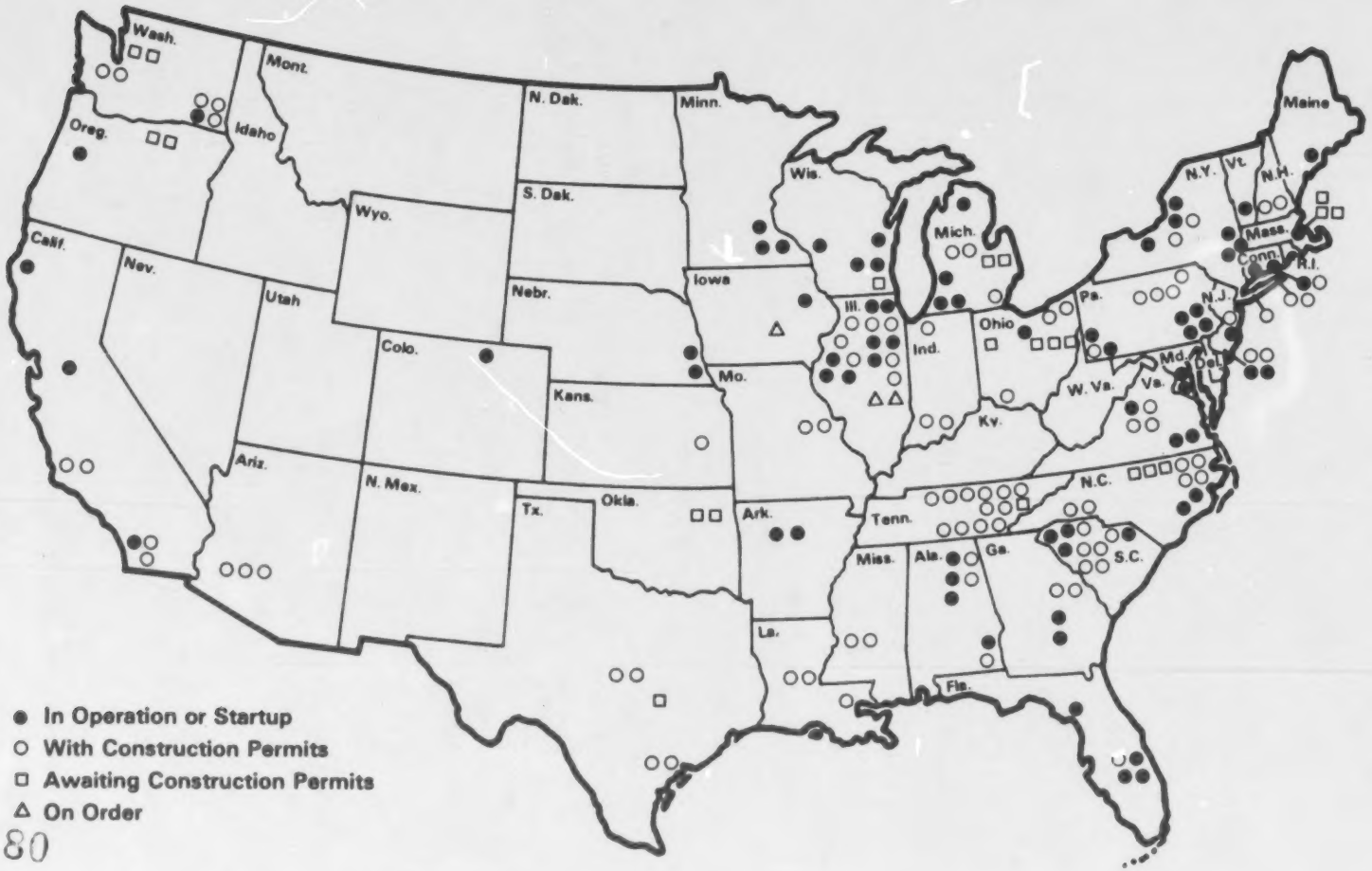
Coalus: Yes, King, but another reason the Earthlings will do just fine is because of the children. Just look down there and listen to the Earth's children. They know they can change their environment and improve their resources.

Oilus: Just listen to their song.

(All but Gods sing.)

The End

NUCLEAR POWER REACTORS IN THE U.S.



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Due to space limitations, symbols do not represent actual locations

At the end of 1979, there were 71 operable nuclear powerplants in 26 States. Construction permits granted as of the end of 1979 were for an additional 91 operations, and 24 others were planned. A total of 38 States now contain sites for nuclear powerplants either operating, under construction, or planned.

Energy Activities
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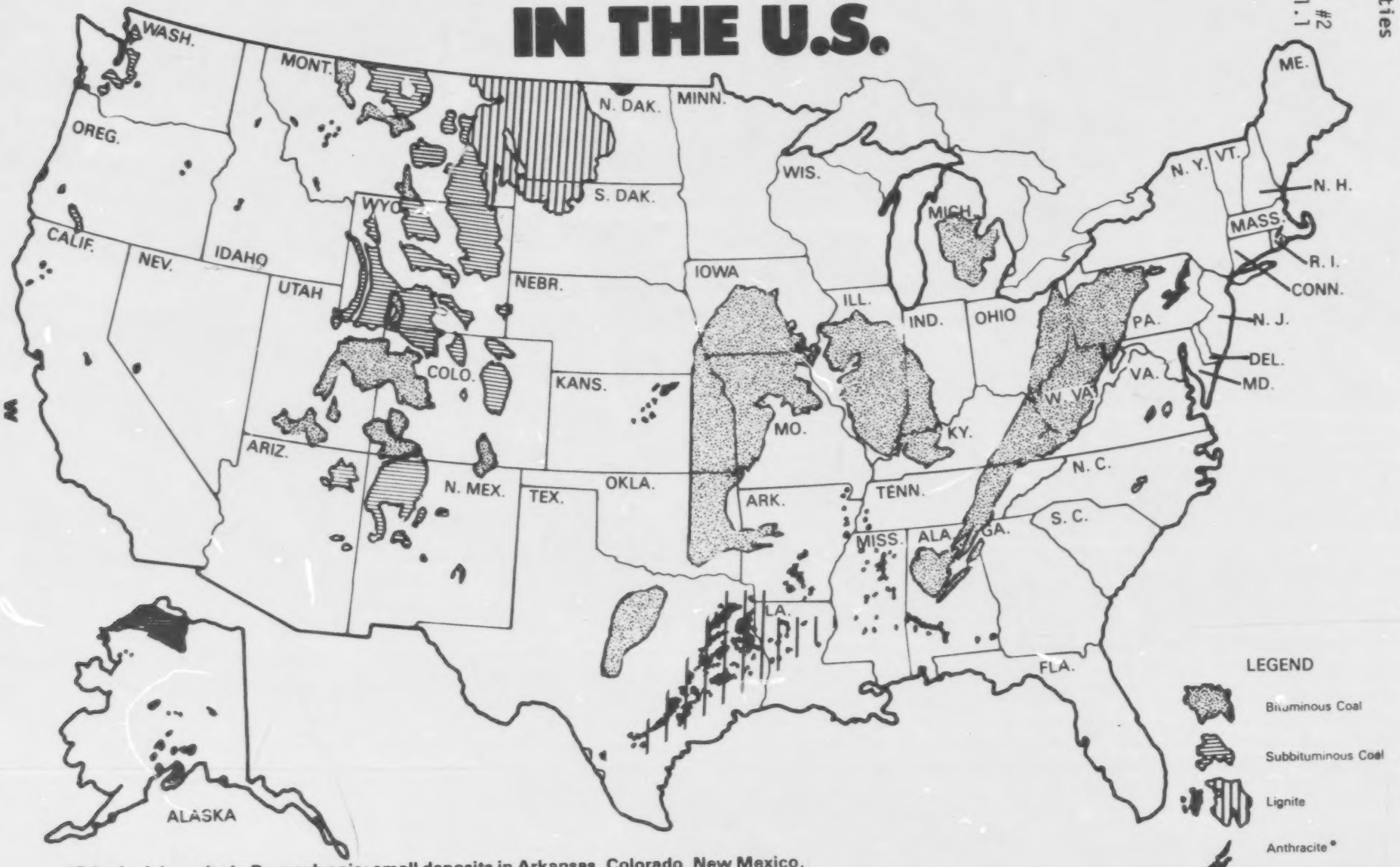
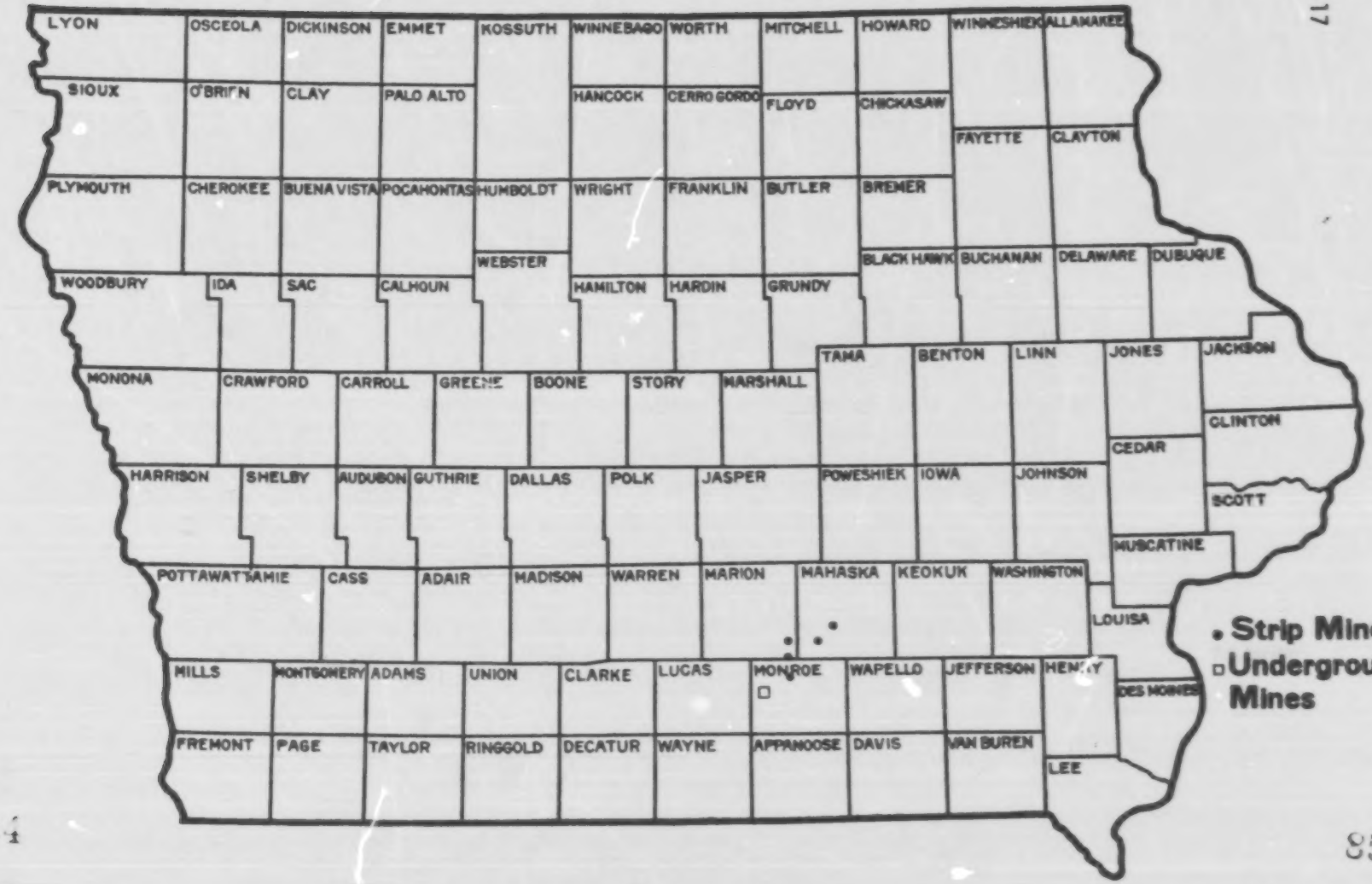
COAL DEPOSITS IN THE U.S.



*Principal deposits in Pennsylvania; small deposits in Arkansas, Colorado, New Mexico, and Virginia. Anthracite - meta-anthracite deposits in Massachusetts and Rhode Island

IOWA COAL MINES



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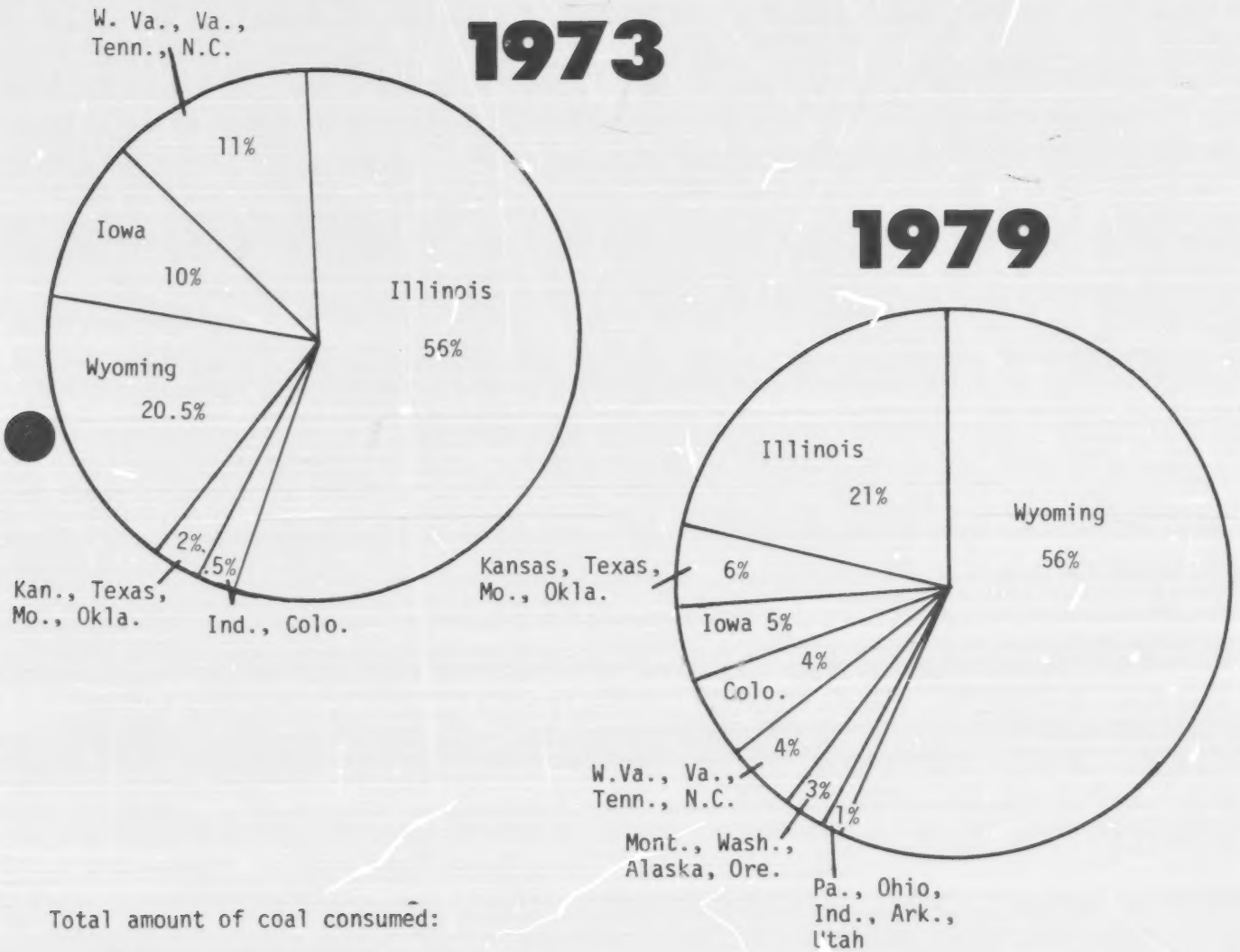
SOURCES OF COAL USED IN IOWA

(bituminous & lignite)



Total amount of coal consumed:

1973 - 6,889 short tons

1979 - 13,571 short tons

ource: Adapted from the "State Energy Data Report", U.S. Dept. of Energy, 1979

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ENERGY IN IOWA

Filmstrip #1 - Part B

#12 Energy not only is important in our personal, everyday lives, but it also has an important place in the growth and economy of a state. Almost all of Iowa's energy comes from imported fuels. In 1979, less than two percent of the energy consumed in Iowa was produced in Iowa. The four major fuels used in Iowa are petroleum, natural gas, coal, and nuclear energy.

#13 Demand for natural gas has increased rapidly in both Iowa and the nation. About 23 percent of Iowa's energy needs were met by natural gas in 1979. This energy was primarily used for heating homes. In fact, 63 percent of Iowa homes are heated with natural gas.

#14 Natural gas pumps, located at the Redfield storage field, pump gas into reservoirs 1,750 feet to 2,700 feet below the farmland.

#15 North of Des Moines near Interstate 80, there is a large LNG (liquefied natural gas) storage facility operated by Iowa Power and Light Company. Northern Natural Gas and Peoples Natural Gas Company both have LNG facilities in Hancock County, Iowa.

#16 Petroleum is the largest single source of energy in the United States and Iowa. In 1974, over 64 percent of the petroleum products in Iowa were used for non-transportation purposes. They were consumed in space heating of homes, offices, and factories. Here we see petroleum product storage tanks located in Polk County.

#17 The only commercial nuclear generating facility operating in the State of Iowa is the Duane Arnold Energy Center near Palo. This power plant began operation in 1974. All of its megawatts are used in Iowa. The Quad Cities plants at Cordova, Illinois and the Cooper Nuclear Station near Brownsville, Nebraska, also provide megawatts for use in Iowa. During 1979, nuclear sources provided 16 percent of all the electricity sold in Iowa.

#18 Coal usage in Iowa decreased slightly in 1974, but coal consumption in Iowa has risen steadily from 1974 to 1979. In 1979 only five percent of the coal consumed in Iowa was mined here. Over half of the coal used in Iowa came from Wyoming mines. In the center of the picutre is the Iowa Coal Project demonstration mine located about seven miles southwest

of Oskaloosa. Also shown is the Childress site in the upper left and in the foreground, a mine operated by Star Coal Company.

Note: (Filmstrip #1 - Part A for 5th grade goes into detail about coal mining in Iowa.)

#19 Iowans do have two other energy sources readily available - wind and solar. Wind power was used in the past, particulary by farmers to pump water, provide power, etc. One farmer of today is still living a life with wind power. John Lorenzen of Woodward, Iowa uses windmills to supply his power. He couldn't see anything wrong with wind machines and decided against hooking up to the power lines which ran near his farm. His wind generator supplies the electricity needed to power such things as his TV, vacuum cleaner, and dishwasher.

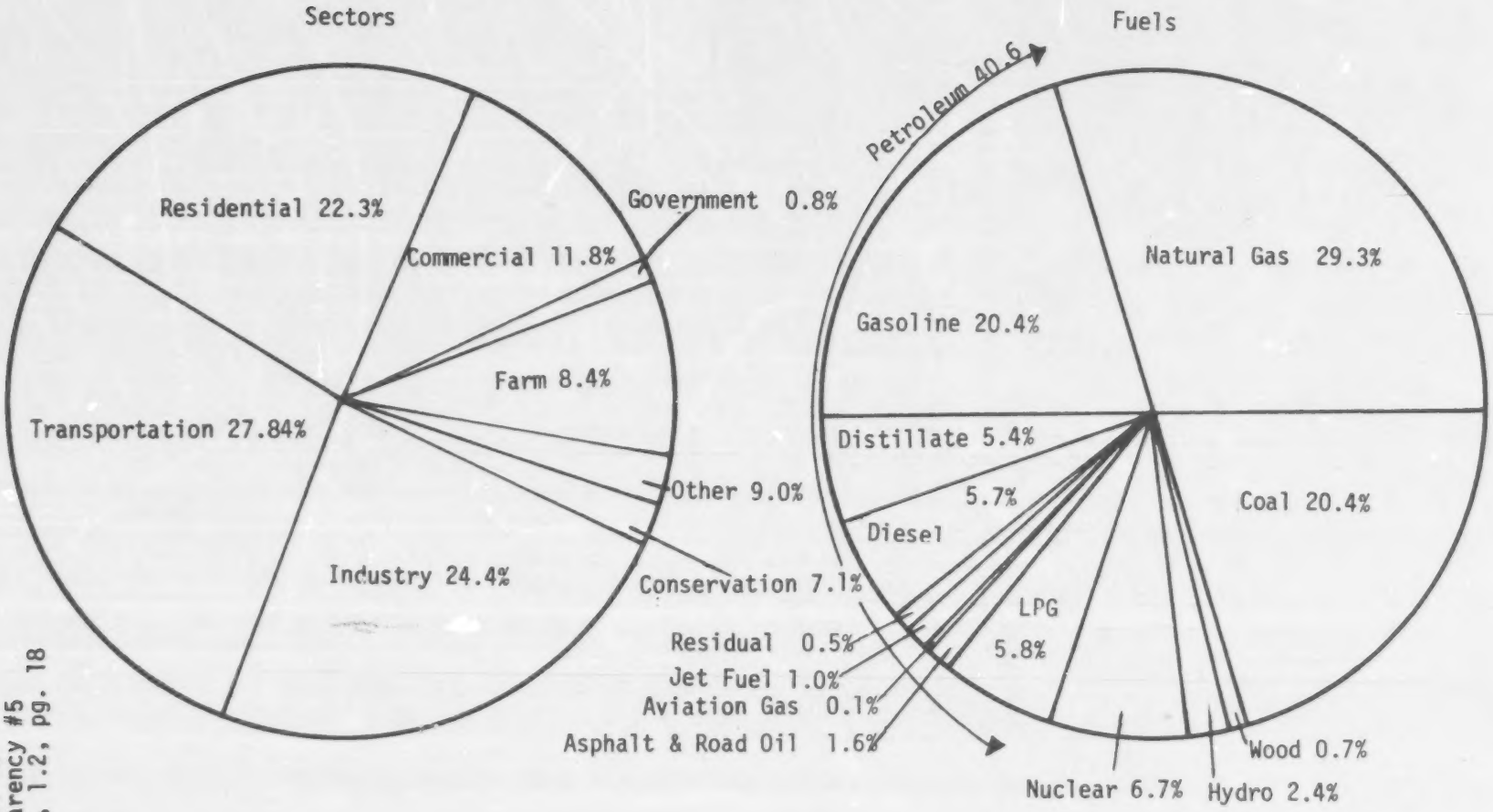
#20 When the wind is slack he has storage batteries ready.

#21 More and more people in Iowa are designing homes and buildings which use energy from the sun. Scattergood School at West Branch, Iowa, uses solar energy to heat its recreation building and the water which is used for showers. In April, 1976, Scattergood received a grant from the U.S. Energy Research and Development Administration (ERDA).

#22 Many Iowa builders and architects are beginning to develop commercial buidings that use solar energy. The Raccoon Valley State Bank of Adel will be able to receive approximately 50 percent of its energy requirements from the sun. The sun is also being used for grain drying in Reinbeck, Vinton, and at Iowa State University.

Source: 1979 figures from the "Sixth Annual Report to the Legislature," Iowa Energy Policy Council, January 15, 1980.

DISTRIBUTION OF IOWA ENERGY CONSUMPTION 1977



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Energy Activities
Grade 5
Packet "B"
Transparency #6
Activity A, 1.2, pg. 18

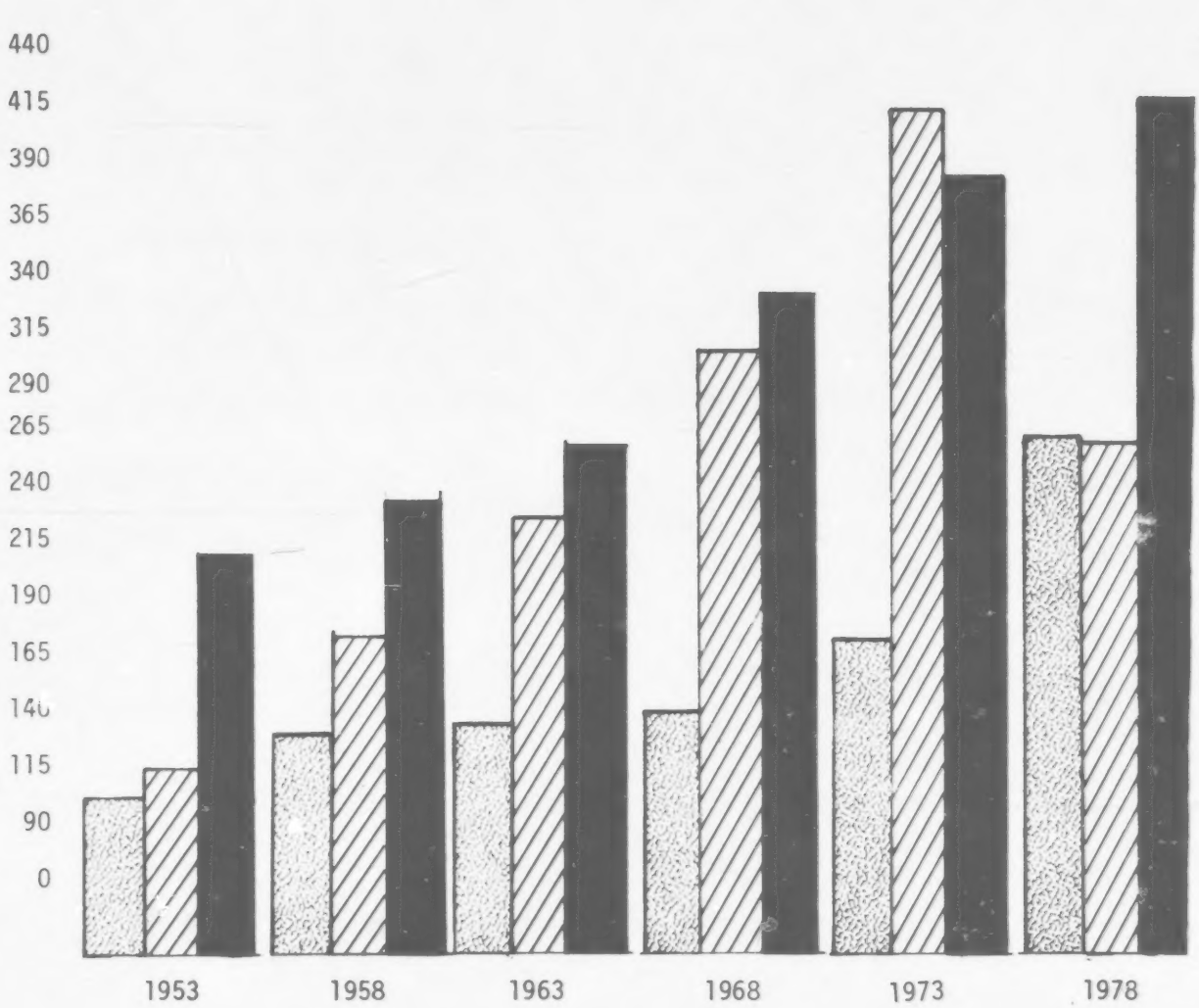
GROWTH OF ENERGY CONSUMPTION IN IOWA

The chart shows the growth for the three major energy sources used in Iowa for the period of 1953 to 1978. The growth for this period was:

281% for coal (bituminous and lignite)

362% (1973) to 232% (1978) for natural gas

207% for total petroleum products



Source: Adapted from the "State Energy Data Report", U.S. Dept. of Energy, 1980.

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What kind of energy does my neighbor use?

Name _____

Ask your neighbors which type of energy they use for water heating, cooking, and heating their home. Put a check for each kind of energy they use.

*Remember to be polite! Tell them who you are and what you are doing. Say "Thank you" when you are ready to leave.

Neighbor's Name	Coal	Oil	Natural Gas	Electricity
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

OIL SONG

Tune: I've Been Working on the Railroad

We've been working in the oil fields, working all day long,

Supplying three-fourths of the energy, that heats our homes and schools,

Oil products go far, We use them everyday,

Like kerosine and asphalt, Consumer you will pay.

Consumers won't you think, consumer won't you plan,

No matter how hard we do our work,

No clothes, or plastics we will make,

Unless conserving is the attitude you take.

WE HAVE THE WHOLE WORLD FOR WHICH WE CARE

Tune: He's Got the Whole World in His Hands

We've got the whole world for which we care,

We've got the whole world for which we care,

We've got the whole world for which we care,

We've got the whole world with energy concern.

We've got the natural gas burning low,

We've got the crude oil under control,

We've got the coal fields with a watchful eye,

We've got the hydro power flowing by,

We've got the nuclear power developing more,

Got electricity generating by the score,

Got government and scientists working with a plan,

We've got the whole world with energy concern.

YOU Can Do Something About It!

*CAUTION: All action should be informed action so reading, learning, interviewing, and discussing are necessary.

Most of us, when we see something wrong, want to try to do something about it. Often, however, we do not do anything because we don't know what action we might take. Below are some things people have done to get desired changes. Which of these actions is <u>your</u> way of doing something? Place a check (✓) by any you have ever done and an asterisk (*) next to any you would consider doing.

<u>Write a Letter</u>

____ 1. Write a letter to the editor of your local newspaper.

____ 2. Write a letter to your Congressmen or your Senators. Compliment them for something they have done about a problem you are concerned about.

____ 3. Send a letter to someone in the news who has done something you respect or admire.

<u>Attend a Meeting or Organize One</u>

____ 1. Write one of the organizations working for a cause you believe in and ask to be put on their mailing list.

____ 2. Ask your own club, church group, etc. to have a meeting or invite a guest speaker on a topic you are concerned with.

<u>Take Part in Some Action</u>

____ 1. Organize a petition drive.

____ 2. Interview people who are in a position to influence others.

____ 3. Wear a button.

<u>Facts to Face Acts</u>

____ 1. Speak up for your point of view.

____ 2. Try to get someone to read a pamphlet or article which argues for a different position than the one he holds.

____ 3. Try to close the gap between what you say and what you do. Let your life be a living argument for what you believe in.

WHO ARE YOU?

Are you someone who...

Y	N	M	1.	will depend upon a car for the majority of your transportation?
Y	N	M	2.	will wear warmer clothes in the winter and keep the thermostat lower?
Y	N	M	3.	will insist on an electric or gas clothes dryer when you have your own home?
Y	N	M	4.	keeps shades drawn on the windows in the summer to keep it cool?
Y	N	M	5.	turns off the lights whenever you leave a room?
Y	N	M	6.	will continue to recycle even though others make fun of you?
Y	N	M	7.	tells others to conserve energy?
Y	N	M	8.	turns the radio on the minute you get into the bedroom?
Y	N	M	9.	will watch a lot of TV at age 40?
Y	N	M	10.	talks a great deal about our energy shortage but keeps using all your appliances?
Y	N	M	11.	believes we will be giving up our "good life" if we cut our use of energy?
Y	N	M	12.	is likely to become increasingly active in energy conservation?
Y	N	M	13.	will be a consistent writer of letters to the editor?
Y	N	M	14.	will run for public office?

"END OF DOCUMENT"